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CONTENTS.

☞ An asterisk (*) denotes an illustrated article

EDITORIALS—

The London Treatise on the Manufacture of Coal Gas.161
Gas Matters in Indianapolis.....161
Gas Works Surroundings.....161
Experiments.....161
Improvement in Gas Business.....162
Contributions to the Theory of Luminous Flames.....162
Water Meters.....163
The Progress of Gas Undertakings.....163
The Petroleum Pipe Line.....163
To Presidents, Engineers and Superintendants of Gas Companies.....164
Report of the Proceedings of the New England Association of Gas Engineers.....165
Report of the Department of Public Works for the Quarter ending Dec. 31, 1873, Bureau of Lamps and Gas.....166
The Manufacture of Coal Illuminating Gas.....168
Great Oil Explosion in Boston.....169
Duty on Coal.....169
Asphyxiated.....169

CORRESPONDENCE—

Gas Governors.....172
Retort Heats.....172
Prices of Gas Coals.....172

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

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THE LONDON TREATISE ON THE MANUFACTURE OF COAL GAS.

This work is now being issued in monthly numbers, and will be one of the most valuable compendiums of information bearing upon the history and the science and practice of gas manufacture yet published. Every gas manager should have it. It is issued in paper covers, so that it can be bound to suit the taste of the subscriber. The issue will occupy about two years. The price of each number, if furnished from this office, is 40 cents a number, or $4.80 a year.

We have already received many subscriptions, and we would urge all those who have not yet sent us their names to do so at once. We propose to send bills for the first 12 numbers upon receipt of subscription.

GAS MATTERS IN INDIANAPOLIS.

By the local papers from Indianapolis it seems that there is a good deal of discussion going on there regarding gas matters. It seems that some time since an "opposition" company applied to the City Council for permission to put down pipes, etc., which was granted upon certain conditions. Among many other claims for consideration made by the new company was the usual one, that *competition* would reduce the price of gas, and the City Council, acting upon this basis, required the new company to furnish bonds, by responsible real estate owners not interested in the new company, that they would do all that they agreed and, in addition, that they would never combine with, or sell out to, the old company. This was accepted, and works built for making gas by one of the water gas processes, we think the Lowe Process; but now the new company ask the City Council to modify their arrangement *slightly*, so as to accept the bonds of the company itself instead of parties outside the company. What decision the City Council have come to in the matter we do not know; but, at latest accounts, they were inclined to argue that if the benefits of competition were so great, why not hold the company to their agreement, and secure this benefit in the most certain manner, as was intended by the first arrangement. The fact is that city goverments are beginning to find out that some how or other the multiplication of gas companies does not always result in a very strong competition, and that often the new companies are so saddled with debt and unnecessary capital that, in order to make a living they are really obliged to do everything they can to prevent the price from going down to where it might, if the capital stock and bonds were anything like a fair representation of the value of the value of the plant required for the business.

GAS WORKS SURROUNDINGS.

As the Spring opens it is a proper time for every gas mannger to see to it that there is nothing about the works, under his control, that can possibly become a nuisance as the season advances, and the warm weather begins.

This is a duty that he owes not only to the community in which he is placed, but to himself and to the men in his employ. It is an old adage that "a workman is known by his chips." Just as truly may a gas manager be known by the condition of his apparatus, machinery, buildings and grounds.

We gave, about a year ago, a receipt for making good whitewash. We have seen it tried, and it has been proved that the receipt is a good one. We do not hesitate to recommend a liberal use of it, wherever an opportunity can be found, about the works.

Not only do we advocate the abatement of nuisances, but, more than this, every works should have its flower beds, shrubs and vines. It costs very little; and, while it makes the place attractive, it has an excellent influence upon the men employed. This is no fancy, we have seen it done, and the effect is surprising. In one instance, in particular, there was great dissatisfaction in the neighborhood, where a large gasholder was about to be built, at the idea of having a gas house nuisance just over the way; but, when finished, the ground about the holder was nicely laid out and turfed, and a few of the simplest flowers planted, and the neighbors now consider the gas property quite an ornament to the neighborhood, at any rate it is no detriment.

Gas companies might do much more in these matters than they do, and the result would be many more friends among their neighbors. In some of the foreign works very elaborate gardens are laid out, and great care taken of them. Let us not be behind in this respect, for whatever is *truly* ornamental must be useful in some way or other.

EXPERIMENTS.

We have had much pleasure, both last year and this, in calling the attention of our readers to the careful and well-recorded experiments that have been laid before the New England Association of Gas Engineers, by the gentleman from the

Boston Gas Light Company. The results pre sented have been only a specimen, so to speak, of what is being done from day to day; and yet both the paper of last year, by Mr. Lamson, and that of this year, by Mr. Malcolm S. Greenough, have given rise to a good deal of discussion, and will, no doubt, lead to very useful results. The value of a set of tabulated results, obtained from a series of carefully conducted and minutely recorded experiments, cannot be over estimated. This cannot be better expressed than in the words of Richard A. Proctor, F.R.A.S., who, in discussing the means by which a true theory may be discovered, says:

"I would remark at the outset that I do not by any means share the opinion of some, who have said that it matters very little what theory is adopted, so that it is a convenient working hypothesis, a string, so to speak, on which to thread the observations without reasoning upon them—in fact without utilizing them. It seems to me, or rather I may speak more confidently and say that the whole history of Science proves, that the real value of observation and experiment lies not in themselves but in what may be deduced from them. They are the raw material whence Science is manufactured. * * * The sole reasonable object of observations is to suggest the true theory and to afford means of testing and righting false ones."

Whatever may have been the rapid strides by which the science of gas making has advanced up to the present time, there is yet much undeveloped; there is a great deal of "rule of thumb" or guesswork. There is no question, in the minds of the thinking portion of the gas fraternity, but what the demand for cheaper gas must be met. The question is how to do it, and still obtain a fair profit on the business. It is only by constant and continued experiments by which the facts of the business are first arrived at, and then by care ful study of these facts, when properly generalized, that the true basis of operations can be determined. Having found out exactly what is being done, and the means of doing it, we then have a foundation to build on, something by which we are able to determine wherein savings can be made and improvements obtained.

In obtaining data upon which to base a theory for guidance in future action, it is of the first importance to use care in the practical manipulation, and also in recording all the attending circumstances so that due weight may be given to each point. The collating of statistics is not one of the strongest points of our gas makers. Too many of those in charge of works have too many, and varied, duties committed to their charge, while a vast majority, perhaps, do not care to bother themselves so long as the general results are satisfactory to directors and stockholders; but the time may come, and we believe it is not far distant, when it will not be so easy to satisfy these parties and, that other and larger party, the consumer at the same time. The demand for as good, or better, gas for less money must be met in some way. The true business way to meet it is to increase the sales sufficiently to meet the necessary reduction in price on the one hand, and to reduce the cost of manufacture and distribution on the other. This latter cannot be accomplished without a thorough understanding of every item now entering into the cost, in the first place, in order that points at which savings can be made can be readily seen; and, secondly, the desired end may be much more readily reached if a little time is spent in some of the practical experiments which suggest themselves on every hand, to make the present system much more efficient.

We are happy to lay before our readers to-day the results of some more experiments on the temperature of retorts. This subject will lead, we trust, to much study and discussion, and its importance most certainly would demand it. We hope that many others will take this matter in aand, and that by the time of the next Annual Meeting of the National Association there may be some valuable statistics collected that will be of great value in the future.

IMPROVEMENT IN GAS BUSINESS.

From several sources in this vicinity we are informed of a slight improvement in gas consumption compared with same time last year. In Brooklyn the oil fever seems to have had its run, and several of the companies report many returns of old customers who have been trying the oil experiment. In one company last week nearly one hundred meters were reset for consumers of this class, and in others a corresponding number. The trouble, nuisance, and poorer quality of the light of the oil lamps being too apparent to require further trial. It is sincerely to be hoped that this is but a begning of a steadily increasing demand for the best and, everything considered, the cheapest light to be had—*GAS.*

Contributions to the Theory of Luminous Flames.

By Dr. Karl Heumann.

[Translated from the "Journal fur Gasbeleuchtung]

In order to prove that the same phenomenon will occur in luminiferous vapors, provided they are not oxidized into a feebly luminous gas by an excess of oxygen, hydrogen was passed through a vessel containing common salt and zinc turnings, on which dilute hydrochloric acid was poured. The gas issued from a fine luting-tube, and burnt with an intense yellow light, owing to the particles of salt carried along with it. When this flame was passed into a vessel containing pure oxygen, no disillumination ensued, but, on the contrary, a far more brilliant light was emitted.

If, therefore, the disillumination of a narrow gas-flame in pure oxygen is a result of the admission of an excess of this latter gas, while disillumination does not take place so conspicuously in atmospheric air, it is because of the presence of the inert nitrogen which dilutes the oxygen and diminishes its oxidizing energy.

To prove the correctness of this explanation, the nitrogen of the atmosphere was replaced by carbonic acid—that is to say, a glass cylinder was filled, over water, with one volume of oxygen and four volumes of carbonic acid, and after due mixture of the two gases a gas-flame issuing from the fine point of brass tube was introduced.

The flame remained just as luminous as if it were burning in atmospheric air; from which it follows that the nature of the inert gas mixed is immaterial, and that the dilution of the oxygen alone regulates the result.

Every neutral gas must act in this way, and therefore the products of combustion of the flame itself will form no exception. If the flame is allowed to issue from a fine brass tube into a flask (with the neck downwards) filled with oxygen, and to burn there, at first the disillumination above described takes place, but presently, when the carbonic acid and aqueous vapors produced by the combustion have sufficiently diluted the oxygen, the flame will begin to regain its luminosity. The light cone that was reduced to a bright point gradually enlarges, and finally the flame, continually increasing in volume, exhibits the same appearance as if it were burning in air; this will occur at the moment when the oxygen remaining in the flask is diluted by the gases of combustion in exactly the same proportion in which, in the air, the oxygen is diluted by the nitrogen.

If the re-illuminated gas-flame continues to burn in the flask, disillumination presently again takes place; but not, as at the first, from the outside by excessive diminution of the luminiferous envelope, but by gradual reduction of the light until the flame is entirely disilluminated. The whole flame continues to increase in size, and is finally extinguished. This method of disillumination is quite similar to the disillumination of a flame by neutral gas, such as carbonic acid or nitrogen, being mixed with the gas burned, and, in fact, the cause of disillumination is identical in both cases. As every ordinary flame* requires two combustibles for its production, their chemical combination causing the gases to glow and emit light, it must be a matter of indifference *which* of the gases is diluted by neutral gas—whether the illuminating gas, as in Knapp's experiment, or the oxygen of the air.

And, in fact, a gas-flame, burning with a bright flame in the air, at once becomes blue if it be introduced into a mixture of five volumes of air and two volumes of carbonic acid contained in a larger vessel. This experiment is, to a certain degree, the reverse of Knapp's, yet it equally causes disillumination, as a consequence of dilution and reduction of the temperature of the flame.

Instead of mixing carbonic acid with the air before commencing the experiment, the mixture may be allowed to take place through the combustion of the flame itself, when it will be found that a luminous gas-flame burning in a flask filled with air, and with its mouth turned downwards, will, after a short time, become fainter, and finally quite blue, at the same time increasing considerably in size. The flame will continue in this non-luminous, almost invisible state, for some time (according to the size of the flask), and burn bright again immediately, if brought back into the air in sufficient time, otherwise it will go out. This case of disillumination is, therefore, quite analogous to the second disillumination which takes place when a gas-flame burns in a closed reservoir of oxygen; only, in the latter case, there is no nitrogen present, and the products of the combustion of the flame alone dilute the oxygen.

When, therefore, a narrow luminous gas-flame is introduced into an atmosphere of oxygen, confined in a close vessel, we observe first—

Disillumination of the flame, during which the diminution of the luminiferous envelope takes place from the exterior inwards, and in favor of the faintly luminous surface which increases in size.

Then, after a short time, increased development of light takes place, till the flame recovers the shape and luminosity belonging to it in atmospheric air, because the energetic oxidizing power of the pure oxygen on the pure gas becomes moderated through dilution with the gases produced by combustion.

And, lastly, in a short time after, disillumination again takes place, but this time chiefly through diminution of the illuminating power of the whole luminiferous envelope, occasioned by increasing dilution of the oxygen still present with the inert gases of combustion, combined with a lowering of the flame temperature. Both these agencies operate with increasing effect, till the flame, after becoming blue, then almost invisible, while still increasing in size, is at length cooled

* Except the flame of exploding materials.

low the temperature necessary for combustion the gas, and is finally extinguished.

From the above it results that disillumination y be produced not only by refrigeration and di-ion of a carbon-cor taining flame, but also by a ird course—namely, *rapid decomposition of the minous material—i. e.*, immediate oxidation of e carbon to a faintly luminous gas (carbonic ide and carbonic acid).

If we recaiptulate the means—as shown during is investigation—by which disilluminated mes may be restored to brilliancy, we arrive at ese results:

That hydrocarbon flames, deprived of their ght by the withdrawal of heat, are revived by *increase of heat.*

That flames disilluminated by dilution with air neutral gas, are restored by *raising the tem-rature of the flame.*

And that flames disilluminated by excess of xygen causing a too rapid oxidation of the car-on, will recover their luminosity by *dilution of e oxygen with neutral gases.*

It would be interesting to know whether flames isilluminated by a mixture of neutral gas, be-ides being restored by heating the burner, would lso become brilliant again if burned under such pressure that the molecules of the combustible as were, notwithstanding the admixture of nitro-en or carbonic acid, forced as closely together s they were originally. Unfortunately, I do ot possess the apparatus necessary for such ex-eriments, and I should like to draw the atten-ion of those talented chemists, who have inves-igated the phenomena of combustion under in-reased pressure, to the action of various flames hen disilluminated by admixture of air or neu-ral gas, or by refrigeration. It also remains to e proved whether the disillumination which a as-flame undergoes in pure oxygen ceases if the xygen atmosphere is rarefied to one-fifth, or less, f its original density.

The essential difference which existed between he views of previous experimenters—namely, on he question as to whether refrigeration or dilu-ion was the cause of the disillumination of car-on-containing flames, when air or neutral gas as mixed with the gas burned—seems to me to e now definitely settled, and the fact ascertained hat, at least, *three* different causes may, any one f them effect disillumination—namely, *refriger-tion, dilution,* and *oxidation of the combusti-le material.*

In most cases two, or even all three of these causes will come into operation; thus, in disillu-mination by nitrogen or carbonic acid, dilution and refrigeration are chiefly concerned; in en-larging the flame by a cold body, refrigeration and the more rapid oxidation of the carbon come into play; while in disillumination by air, all three causes are combined; moreover, in this lat-ter instance, the presence of the oxygen added occasions an increase of the flame temperature, and a diminution of the flame itself—effects quite opposed to the action of refrigeration and rare-faction.

From this reasoning it follows tha' the much-canvassed flame of the Bunsen burner is really the ultimate result of a whole series of forces act-ing, some in the same, some in opposite direc-tions; and it is not surprising views should differ so widely respecting the constitution of luminous flames, when this very flame of the Bunsen bur-ner is usually selected as the most fitting exam-ple of disillumination, thus unconsciously choos-ing the most complicated instance, and the least fitted of any for introductory study.—*London Journal of Gas-Lighting.*

Water Meters.

A verp important distinction which should be made by the general public, but which seems thus far to have escaped recognition, should be right here laid down with emphasis—for upon it, to a great extent, hinges the question of the adoption of water meters. We believe that even those who are most willing to admit the desirability of the introduction of water me-ters, seem to doubt its possibility, or its kindness to certain classes. "Water," says Quilibet, "is one of God's own gifts. Water should be free as air, than which it is no less necessary to our existence, health, and comfort." Granted. And so to a certain extent are all God's gifts. Like air, so water, and timber, and stone, and fruit, and fish, are most assuredly to be had for the getting, if man will only go far enough and secure them without interfering with another's convenience and store, and will only carry them where he wants them. But the wildest communist who ever insisted that the earth was the Lord's, and the fulness thereof, and that therefore tangible blessings should be free for the getting, would scarcely claim the right to free transportation of his salmon and sand-stone, and hemlock, and the rest of them. He must e'en lug his fish home himself, and hire men for the quarrying and hewing, and teams for the hauling of "his share" of the building material; and if "his share" or "his claim" be tenfold larger than his less needful or wantful neighbor's, then must his out-lay for getting and transporting be proportionate.

And so with water. It is free as air or timber; and no one thinks of charging for it, *per se.* But water-rates—whether they be paid to the Oriental "drawer of water" who carries it in leathern sack and on his shoulders, or to the Occidental corporation, with Worthington pumps and six-foot mains—are charges merely for getting the water and carrying it for miles to one's very door, and even into those *sancta sanc-torum,* one's bath-room and bed-chamber.

Assuredly, then, he should have most freight to pay who has most freight carried: and all prating about the injustice or unkindness of *pro rata* charges, is idle and illogical.

But there is a further point to urge in favor of the meter system, and that a most important one; touch-ing, not the heart-strings, but those vibrating more strongly, and yet from less disturbing influences—the strings of the purse. If it can be shown that by the general introduction of meters, there is not only the possibility, but a very strong *probability,* of a lessen-ing of water-rates, even under an increased permis-sion of useful consumption of water—then but one thing remains—to show that there are, or can be made, cheap, durable, and non-tamperable meters, capable of registering correctly under all conditions of quantity, qality, and pressure of water.

In our next article we will discuss the question of the *pro rata* system in its aspects as a probable lesse-ner of water-rates, under freer useful consumption than is now permitted us.—*Polytechnic Review.*

The Progress of Gas Undertakings.

SOCIETY OF ENGINEERS.

Mr. Thomas Cargill, C. E., the President of the So-ciety of Engineers, delivered his Inaugural Address at the meeting on the 5th ult. In the course of his remarks, referring to the progress of water, sewerage, gas, and other works, he said:

The erection of gas-works in towns of any preten-sions to size, either at home or abroad, is now so usual a procedure that it fails to excite much notice. New gas-works, or extensions of existing ones, are being carried out in our own, as well as in nearly every for-eign country which can lay claim to even partial civ-ilization. The experiences of the last few years will clearly show, so far as the Metropolis is concerned, that the tendency to amalgamation, or centralization, is very much on the increase.

In 1869 there were 13 gas companies supplying London. In 1870 the number had diminished to 11, not by the extinction of the other two, but by the in-corporation or absorption of them into the others. This number was again reduced in the following year to 10, subsequently to nine, and ultimately to six, which represents the number of separate and distinct companies supplying gas to the Metropolis. These are The Gaslight and Coke Company, the Phœnix, the London, the Commercial, the South Metropolitan, and the Surrey Consumers. The capital of these six com-panies in 1875 was over eight millions. One of the advantages attending amalgamation is, that a marked decrease has taken place in the loss of gas from leak-age and other causes. The amount of loss has been reduced from 17½ per cent. to less than 7 per cent. But the chief benefit resulting from amalgamation is the diminished price at which the public can be sup-plied. Companies are empowered now to pay one-quarter per cent. over and above the maximum divi-dend of 10 per cent. for every penny they take off the price of their gas per 1000 feet. The company sup-plying the Metropolis with three-quarters of all its gas, now charge 3s. 6d. instead of 3s. 9d. per 1000, which is equivalent to three-quarters per cent. more divi-dend. The quantity of gas sold by the company who have made the authorized reduction amounts yearly to 14,000 million cubic feet, which, taking the differ-ence of the two prices already mentioned, benefits the consumers to the extent of £175,000 per annum. It is an open question how far the principle of amal-gamation will be carried. The companies situated re-spectively north and south of the river might amalga-mate, or the incorporation of the whole say into one, might be accomplished It is very possible that the principle of incorporation will be carried still farther, but the advisability of its reaching so extreme a point as unity is a fair matter for discussion.—*Jour. Gas Lighting.*

The Petroleum Pipe Line.

There has been a great deal said rcently about the scheme for conveying petroleum from the oil regions to the seaboard through a line of pipe, thus doing away with the present system of transportation by rail. Quite a number of papers, both in Philadelphia and Pittsburgh, have demonstrated to their own sat-isfaction, at least, that the whole scheme is a mistak-en if not a fradulent one, and that the pipe line stock holders will never again see the money they put into it. We do not know anything about the merits of this case; but as this is a new feature in the great in-dustrial enterprise of the day, it is at least worthy of record.

The plan, then, is to lay a line of four inch pipe, underground, all the way from Brady's Bend, on the Allegheny river, over the mountains and through the valleys, to Gettysburg, where the main line will branch, one section going to Philadelphia and the other to Baltimore. Pumping engines will be erected wherever necessary, the present plan contemplating stations at every fifteen miles along the route, each to be supplied with an engine of 100 horse power. The engineer in charge is Mr. Harman Haupt, of Hoosac Tunnel fame, who is pretty well known here in the coal region. As to the location, Mr. Haupt says:

"I propose a line ascending rapidly from the Alle-gheny river and following the table lands along the water sheds of the country, passing about twelve miles north of Indiana, and striking the Ebensburg branch of the Pennsylvania Railroad at Bradley's Station; thence to Cresson, along the pike, in close proximity to the railroad; from Cresson an air line of fourteen miles will strike the intersection of the Holidaysburg Branch at Brook's Mills; thence following the general direction of the road. The next sixteen miles to Great Aughwick Valley will be near railroads, and from this point to Newville, thirty miles, will be over a broken country, requiring the construction of roads for dis-tribution. The total cost of three hundred miles of four-inch pipe, with the expense of hauling, cutting woods, laying and ditching, etc., is estimated at $1,250,000. The cost of transporting 1,500,000 bar-rels of oil from Brady's Bend to Philadelphia by a pipe line has been estimated at $250,000, which is 16⅔ cents per barrel, while the minimum cost of carrying oil by rail the same distance (395 miles) is 39½ cents per barrel," *Pottsville Miner's Journal.*

To Presidents, Engineers and Superintendents of Gas Companies.

We desire to call attention to a new and improved Governor for regulating the pressure of gas in street mains.

It is of very great importance to all gas companies to have this service as accurately and smoothly performed as possible, in order to make a satisfactory distribution to consumers; to *save* the loss on street lamps, and by leakage on the mains and pipes, which is always very much increased by any excess of pressure above that needed to give the proper light.

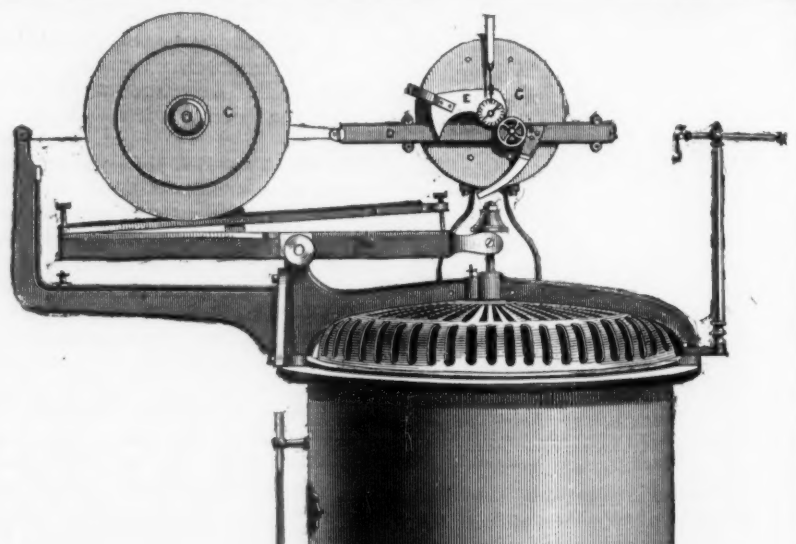
We claim that this Governor will do the work closer and more satisfactorily than any other yet presented, and ask your careful examination.

The "Indicator Card" below the Governor is an exact copy of an original card or paper made by the Pressure Indicator at the People's Gas Works, Brooklyn, N. Y., and shows the daily working of the Governor. Day Pressure, 7-10 of an inch; night pressure, 2 4-10 inches, continued until half-past ten, P. M., and then gradually diminished to the midnight pressure of 1 1-10 inches, and then to the day pressure.

The distinguishing feature of this Governor consists in *automatically changing the position of the weights* to operate the valve and make the desired variations in pressure; *as opposed* to putting on and taking off weights by hand of an attendant. *The card given is the only argument needed to prove which is the best method.*

The operation of the Governor is as follows: At the inner end of the lever A is suspended a rod which carries a *perfectly balanced valve* which works easily in a proper chamber, located in the outlet pipe of holder. At the outer end of lever A is pivoted an adjustable bar or track, B, on which are placed the rolling weights, C.

These weights are connected by a cord to a sliding bar, D, working between friction rollers, and driven by a cam, F, on the main spindle of a powerful clock, contained in the case, G As the weights are moved in, at the proper time, by the action of the clock and cam, the valve below is opened, and the pressure gradually increased to the desired point, held there until the time set for it to be diminished, by the rolling back of the weights and the consequent gradual closing of the valve. The cam E is easily and quickly



Isbell's Automatic Governor for Regulating the Pressure of Gas in Street Mai

secured in any position on the spindle, and has stamped upon it the hours of the day as shown by the index.

It will be at once apparent how any desired effect can be obtained by changing the position of the cam, or by putting on cams of different proportions.

The Automatic Governor has many important advantages.

It will do *more smoothly and accurately*, all that governors of ordinary construction can do.

It will absolutely control the pressure at the desired point under the most trying conditions; even the *breaking of a pipe* or the rapid lighting up or putting out of the lights in a large district.

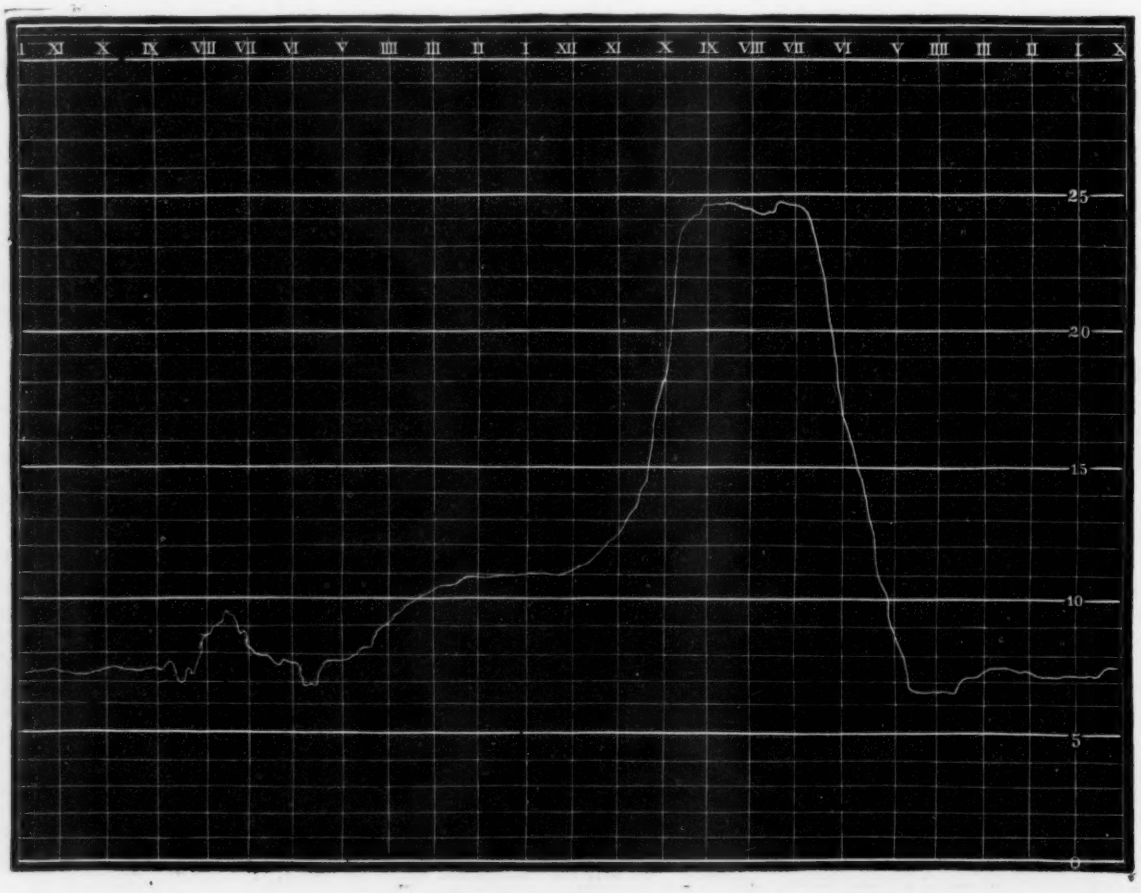
It saves labor, as it dispenses with the constant care and watching, demanded to keep the p right, by means of a valve, or by putting on a ing off weights.

It works equally well on pipes of large cr diameter.

It is entirely simple in construction, durabl is *not liable* to get out of order easily; on the co it needs very little care and attention.

We make them without the automatic fea desired, and they are far superior in action other form of governor.

Send for prices and other information to Smi Sayre Manufacturing Co., Coal and Iron Ex Building, Room 68, Cortlandt and New Chur New York.



t of the Proceedings of the New land Association of Gas Engineers.

[OFFICIAL]

[Continued from page 123.]

AFTERNOON SESSION.

meeting was called to order by the President clock, P. M., and the members having taken ats

Slater exhibited a diagram, showing at a glance, unt of gas distributed by the Providence Gas y by months, during the whole time the com- s been in operation—a period of twenty-seven also the total number of tons of coal carbon- d the total quantity of gas distributed each This diagram is made by taking paper of any t may be considered convenient or desirable, horizontal ruling, dividing it into spaces rep- g hundreds of thousands or millions of feet, g to the quantity of gas distributed monthly; if the least quantity of gas distributed in any th during the time which the diagram is in- to represent is one hundred thousand, let each tal line represent one hundred thousand; or, antity of gas amounts to millions, let each present millions, then, on the margin, mark e 1, 2, 3, 4, 5. and so on, up to the largest of gas distributed during any one month. If ram is intended to represent the distribution by months, divide it perpendicularly into spaces, representing months, or if it be de- represent the quantity of gas distributed by ivide it into fifty-two spaces, each one to be at the top with the name of the month or s the case may be. Now, supposing it is in- to represent the quantity of gas distributed by for a year, place a large dot under the head- ach month, at such point as will represent the of gas distributed for that month, being by the figures on the margin before mentioned, w a line through these dots which will repre- quantity of gas distributed for each month out the year. These lines may be drawn for mber of years that may be desired. At the ach line place the date of the year which the resents, and opposite the date of the year in repared by dividing into perpendicular col- lace the total quantity of coal carbonized for , the total quantity of gas distributed, etc. columns may be multiplied so as to include rage yield per ton of coal for the year, yield nd, average quantity of gas made by each re- . If the quantity distributed should be less month than the corresponding month of any s year, then the lines will cross each other. ould be made of different colored inks that easily traced. This diagram forms a very ent mode of representing the business of any pany, and shows at a glance by the difference paces between the lines, the comparative in- r decrease in the quantity of gas distributed, es within the reach of all the officers of the y a quick and easy means of comparing the by weeks, months, and years.

members having examined the diagram pre- by Mr. Slater, it was laid aside for further in- ; if desired.

l that a committee of three be appointed by r to report to the Association, after consulta- h each other, the time and place for holding semi-annual meeting.

chair appointed Messrs. Gerould, Harbison, lins as that committee.

e retiring for consultation, the committee re- the members to name several places, infor- rom which they might select, if they saw fit, for holding said meeting.

following localities were named: Portsmouth, Stonington, Conn.; Hartford, Conn., and ter, Mass. The committee then retired.

President—The committee appointed this fore- e now ready to report through their chairman.

Mr. Lamson—Your committee would recommend that the executive committee be authorized to have such diagrams, plates, tables of figures, etc., as are presented to them by members, as parts of papers that are to be read at future meetings, photographed in such a manner that they may be exhibited by a stereoptican. And if a sufficient number of plates have been taken to warrant the expenditure, the committee shall engage some suitable artist to be present at the meetings, and exhibit said plates, while papers are being read. The expenses incurred shall be paid from the funds of the Association.

Your committee further recommend that the sum of fifty dollars ($50.00), and any further sum that may be set apart for that purpose, be paid from the funds of the Association, for the best dissertation upon any subject connected with the manufacture of illuminating gas.

Your committee are much pleased to further report to the Association that George D. Cabot, Esq., an ex-president of this Association, has authorized them to say that he will pay to the author of the best paper upon any subject connected with the manufacture of illuminating gas, the sum of fifty dollars ($50.00) in addition to that offerred by the Association.

Mr. Dwight moved that the report of the committee be received and adopted.

Mr. Armington—Before that vote is taken I have a few words to say upon the subject. I feel as probably every member of this Association does. Only a few hours have elapsed since this subject was first started, and this offer of fifty dollars made by our ex-president shows the interest which will be manifested on this subject.

This action of Mr. Cabot seems to me, sir, to be one of those generous things that we should not forget.

Further than that, sir. I agree to that report, as presented by the committee, with the exception of one clause. I regret that I am obliged to differ with the committee on some points, but the chairman of the committee agreed that I should have an opportunity to talk about it; so far as I am personally concerned, I hope, "from coal", may be inserted, so that the report may read, that the sum of fifty dollars be paid for the best dissertation upon any subject connected with the manufacture of illuminating gas from coal." I feel that time and money enough have been spent upon experiments to obtain gas from other substances than coal.

Mr. Lamson—I differ with the gentleman who has just spoken. I feel that we should leave the field open for the investigation of all matters that are of interest to our profession. It is true that much time, and very much money has been spent in various experiments to produce gas from many substances other than coal, and, up to the present day, we all feel that nothing has yet been found, which, when manufactured according to methods proposed, compare at all favorably with gas from coal.

Yet I am glad that experiments are still going forward, and that there are thinking men who are studying over some of the good ideas which have been embodied in some of the many patent processes, which have caused us so much annoyance in the past few years.

If there are interesting experiments being made with steam, or oil, or any other article for the production of illuminating gas, and the facts and figures of such experiments can be shown to us, I say let us have them.

Facts obtained by the careful experimental work of others are always of value to those who are studying any scientific subject. I would not have long and tedious discussions of theories; but there is no danger of that, for our by-laws provide that all papers shall be presented to the executive committee before being read before the Association.

I, myself am very much interested in the experiments that have been, and are being made to make gas from coal, or oil, in connection with steam.

To be sure nothing so far has been accomplished that deserves the name of success, at least for the supply of a town or city, still, I feel that water will, some time in the future, play an important part in gas manufacture.

Mr. Harbison moved an amendment, so that the report should read "for the best dissertation upon any subject connected with the manufacture of illuminating gas, from substances of which coal is the principle ingredient.

Mr M. S. Greenough—I must say I hope that motion will not prevail. I am not prepared to stand by Mr. Lamson entirely about the future use of steam, still I do not think that we can afford to put ourselves in such a position that in the future we shall have been found to stand in the way of improvements; a good many advances have been made in this country in times past, in the face of ridicule and contempt, and it is quite possible, that, before many years, we may find ourselves diluting our gas with steam.

Mr. Cabot—When I made that offer to-day, I meant that it was to be confined exclusively to members of the Association, I am in favor of the amendment.

Further discussion followed in which Messrs. Harbison, Gerould, Wood, Stiness, and others took part. A vote on the amendment being taken, it resulted in a tie, which was decided by the President voting in the affirmative.

The report as amended, reads as follows:

That the executive committee be authorized to have such diagrams, plates, tables of figures, etc., as are presented to them by members as parts of papers that are to be read at future meetings, photographed in such a manner that they may be exhibited by a stereoptician. And, if a sufficient number of plates have been taken to warrant the expenditure, the committee shall engage some suitable artist to be present at the meetings and exhibit said plates, while papers are being read. The expenses incurred shall be paid from the funds of the Association.

Your committee further recommends that the sum of fifty dollars, and any further sum that may be set apart for that purpose, be paid from the funds of the Association, for the best dissertation upon any subject connected with the manufacture of illuminating gas, from substances of which coal is the principal ingredient.

Your committee are much pleased to further report to the Association, that George D. Cabot, Esq., an ex-president of this Association, has authorized them to say that he will pay, to the author of the best paper upon any subject connected with the manufacture of illuminating gas, from substances of which coal is the principle ingredient, a sum of fifty dollars in addition to that paid by the Association.

The report as amended, was received and adopted.

Mr. Neal—At the meeting of the directors held last evening, the question of the practicability and expediency of making another attempt to obtain from the members of the Association, statistics relative to the operations of their several companies, to be arranged by the secretary in a tabular form for the use of the Association was discussed. A few years since, a committee appointed for that purpose, compiled a very carefully prepared batch of questions to be answered by the members of the Association, in whole or in part, as they should see fit. These tables containing forty-two questions were mailed to every member by the secretary, with the request that they be returned to him with the proper answers appended to the questions, as soon as convenient. In a few cases answers to all the questions were received; in others part of the questions were answered, but the majority of those called upon for information, took no notice of the communication whatever; so the project, which, if properly carried out, would have been of great benefit to the Association and to the gas interest generally, proved a failure, and the few papers containing the replies to the interrogatories, were filed away out of sight, among the secretary's papers. This failure to elicit replies from the members is deeply to be regretted, as great pains were taken by the com-

For conclusion see page 170.

Report of the Department of Public Works for the Quarter Ending December 31, 1876, Bureau of Lamps and Gas.

DEPARTMENT OF PUBLIC WORKS,
BUREAU OF LAMPS AND GAS,
NEW YORK, January 4, 1877.

Hon. Allan Campbell, Commissioner of Public Works:

Sir: In accordance with the provisions of section 27, chapter 335, Laws of 1873 (the city charter), I herein submit a report of the transactions of the bureau of lamps and gas for the quarter ending December 31, 1876, with a summary of the same for the whole year, together with such suggestions and recommendations as I deem advantageous to the city.

In Exhibit "A" will be found an abstract of all vouchers drawn during the quarter, showing a total of $213 406.37 on account of appropriation for lamps and gas, and $104.16 on account of "Contingencies Department of Public Works."

In Exhibit "B" will be found a statement showing the amounts expended for gas to each of the public markets, offices, etc., and for repairing, fitting up, and lighting the public lamps, etc., during the first, second, third, and fourth quarters, and the sum total for the year. The expenses of repairing, fitting up and lighting the public lamps for month of September are included in the column of fourth quarter.

In Exhibit "C" will be found a summary of the appropriation for "lamps and gas" for 1876, giving the amount of vouchers drawn during each of the four quarters, showing a total expenditure for the year of $679,349.10, with outstanding liabilities against the appropriation of $160, leaving a surplus balance of $1,240.90.

Exihbit "D" is a summary of the lamp account, giving the number of new lamps lighted, old lamps relighted, and lamps discontinued by each gas company during the quarter, and the number lighted by each company on December 31, 1876; also recapitulations of this account for the quarter and the year, showing a total of 459 new lamps lighted, 379 old lamps relighted, and 578 lamps discontinued during year, and the total number of lamps burning on December 31, 1876, under the supervision of this bu-, to be 20,399. There were also on the same date 870 lamps on the several parks and places under the control of the Department of Parks, making a total of 21,269 lamps in the city.

Exhibit "E" is a time-table for lighting and extinguishing the public lamps for the year 1877, with the instructions to lamp-lighters, which are printed on the backs of the table. As the lamplighters are employed by the gas companies, and hence are not under the control of this bureau, rules, or instructions for their guidance, have never been printed or furnished with the table issued from this department, but the matter has been left to their several superintendents. In consequence, however, of the neglect or ignorance of some of the new lamplighters, I have considered it necessary that some rules should be adopted by this bureau, and that the gas companies shall compel their lighters to comply with the same, in accordance with that provision of the contracts wherein it is agreed that they (the gas companies) "will in all things be governed by such reasonable rules and regulations as the Department of Public Works may, from time to time, establish or direct relative to the lighting, cleaning, and protecting the lamps and street signs." As each and every lamplighter will be furnished with a copy of the time table, and consequently with the instructions, it is to be hoped and I shall expect and insist that ignorant or neglectful lamplighters will be brought to a proper understanding of their duty. Much difficulty has heretofore been experienced in keeping the glass street signs in the proper positions in the lanterns, and they are too frequently found with their wrong side facing the street, and hence are quite unintelligible. Lamplighters, in cleaning the lantern, remove the sign, and, through ignorance or gross carelessness, will replace the same either on the wrong side of the lantern or with their backs facing the street, and very many are broken through rough or careless handling. These useful guides, when properly maintained, are of great convenience, not only to our own citizens, but more especially to the vast number of non-residents constantly visiting our metropolis, and who, perhaps, are strangers to our streets. If improperly placed, however, the are not only useless, but they cast discredit and reproach upon the officials having them in charge. By means of the directions contained in the printed instructions, I am in hopes that better care will be observed with these signs in the future.

Up to within the past year the street signs procured by this bureau were made of ground glass, with the street names painted thereon, but the lettering soon became obliterated by chipping or peeling off, as the paint became dry and brittle, thereby rendering the same entirely useless. The use of those signs was then abandoned, and the present sign adopted. These are made by the "sand blast" process, and the lettering is indestructible, except by the breakage of the glass. The signs, however, are entirely too thin for durability, and hence, for economy; the glass of which they are now made is the ordinary "single-thick" stained glass, and this is rendered still thinner by the process of taking off a portion of the face, by the sand blast, in the forming of the letters composing the street names, and, in consequence of the thinness of the glass, the signs are frequently broken, and their renewal is a constant source of trouble and expense. In future, as street signs are required, I recommend that they be procured of double-thick glass for it is obvious that these will be cheaper in the end taking into consideration their greater durability, and the heretofore frequent expense of replacing them in the lantern.

The cleaning of the lanterns is another important matter which I intend to impress upon the minds of the lamplighters. It is evident that very many of the lamps on some of our thoroughfares have not been kept in as cleanly a condition as they should be, and I shall insist that they be kept in a better condition in the future. Dirty, and hence, unsightly street lamps, not only bring discredit upon the city authorities, but much of the light from the flame is lost thereby, for however good the quality of the gas, or however large the capacity of the burner much of the illuminating power is inevitably lost unless the glass in the lanterns is kept clean.

The following statement will show the number of new lamps fitted up, lamp posts reset, removed, repaired, etc., during the year, and the average number of lamps burning and new lamps lighted by each company, during the several years, from 1871 to 1876 both inclusive, viz.:

By What Gas Company.	New Lamps fitted up.	Lamp-posts re-set.	Lamp-posts removed.	Lamp-posts straightened.	Stand-pipes refitted.	Columns refitted.	Columns reloaded.	Lamp-posts
New York Gas-light Co.	11	28	22	82	82	7	86	
Manhattan "	4	31	41	53	87	4	57	
Metropolitan "	189	43	22	20	...	6	32	
Harlem "	203	115	151	17	18	...	1	
N. Y. Mutual "	5	26	18	311	198	6	96	
Central "	2	...	...	...	...	...	...	
Suburban "	41	...	...	...	...	...	...	
Totals	455	243	254	483	385	23	272	

By What Gas Company.	Average number of lamps burning in 1871.	Average number of lamps burning in 1872.	Average number of lamps burning in 1873.	Average number of lamps burning in 1874.	Average number of lamps burning in 1875.	Average number of lamps burning in 1876.
New York Gas-light Co.	3,207	3,042	3,025	3,008	3,009	2,658
Manhattan "	7,020	6,870	6,758	6,546	6,550	4,960
Metropolitan "	3,828	3,936	4,002	3,582	3,514	3,632
Harlem "	4,093	4,040	4,097	4,024	3,915	3,958
*N. Y. Mutual "	.....	.....	.....	440	584	2,510
†Central "	.....	.....	.....	1,523	1,524	1,536
‡Suburban "	.....	.....	.....	924	932	932
Totals.	18,148	17,888	17,882	20,047	20,028	20,159

* Transferred from account of the Metropolitan Gas-light Co.
† In Twenty-third Ward, transferred to this city by annexation.
‡ In Twenty-fourth Ward, " " " "

By What Gas Company.	New Lamps Lighted in 1871.	New Lamps lighted in 1872.	New Lamps lighted in 1873.	New Lamps lighted in 1874.	New Lamps lighted in 1875.	New Lamps lighted in 1876.
New York Gas light Co.	13	14	5	28	27	11
Manhattan "	112	17	11	33	23	4
Metropolitan "	164	174	147	142	140	187
Harlem "	128	300	364	102	312	235
N. Y. Mutual "	...	...	...	...	2	5
Central "	...	...	...	...	1	2
Suburban "	...	...	...	...	...	15
Totals	417	505	527	305	505	459

Gas mains have been laid by the several gas-light companies during the year as follows:

By New York Gas-light Co.,	.....	feet.	Total miles laid to Dec. 31, 1876		109 miles	2,480 feet
Manhattan	"	7,392	"	"	"	172 "	4,752 "
Metropolitan	"	19,016	"	"	"	123 "	181 "
Harlem	"	42,219	"	"	"	105 "	4,428 "
N. Y. Mutual	"	43,562	"	"	"	90 "	385 "
Central	"	.....	"	"	"	36 "	4,130 "
Suburban	"	10,560	"	"	"	21 "	2,650 "
Municipal	"	.....	"	"	"	3 "	4,780 "
Knickerbocker	"	57,173	"	"	"	10 "	4,373 "
Total	.....	179,922 feet, or 34 402-5280 miles.					
Total miles of gas mains in city on December 31, 1876.						674	1759-5280

The Harlem Gas-Light Company have removed 17,083 feet.

The following statement will show the prices bid by the several gas companies, in their proposals of December 11, for lighting the public lamps for the year 1877, and the prices paid for the year 1876, showing the increase per lamp and the total increase for 1877.

Name of Bidder.	No. of lamps in district.	Price per lamp in 1876.	Price bid for 1877.	Increase per lamp.	Total increase.	
New York Gas-light Co.....	2,453	$23 00	$36 00	$13 00	$31,889 00	
Manhattan "	4,121	23 00	36 00	13 00	53,573 00	
N. Y. Mutual "	3,537	25 75	36 00	10 25	36,254 25	
				Decrease.	Decrease.	$121,716 25
Metropolitan "	3,742	34 12½	32 00	$ 2 12½	$ 7,951 75	
Harlem "	4,075	37 95	37 50	45	1,833 75	
						9,785 50
Net Increase.....						$111,930 57

The amounts named in the above proposals were entirely unanticipated, inasmuch as it was hoped and expected that the competition between the old and the new companies would still be maintained, and consequently that the prices bid for the year 1877 would at least be as favorable as the rates paid in 1876. A contrary result, however, having been ascertained, and finding that there had been no competition between any of the gas companies, the Mayor, Comptroller and Commissioner of Public Works (the three officers designin section 73 of the city charter, and for convenience called the Gas Commission), by a unanimous vote, rejected all the bids and adopted a resolution directing new specifications to be prepared for the three months ending March 31, 1877 (omitting the clause wherein the repaving was to be done by the Department of Public Works), and the usual advertisement inserted in the *City Record* for proposals to be rec'd on Dec. 28.

The following statement will show the rates bid in these proposals for the first 3 months of 1877, also the prices paid for the first 3 months of 1876, with the decrease and increase in the proposals for 1877, to wit:

Name of Bidder.	No. of lamps in district.	Price for first 3 months of 1876	Price for first 3 months of 1877	Decrease per lamp from 1876	Total decrease for three months of 1877.	
New York Mutual Gas light Co.....	3,537	$9 00	$7 50	$1 50	$5,305 50	
Metropolitan "	3,742	10 50	9 00	1 50	5,613 00	
Harlem "	4,075	10 98	10 57	41	1,670 75	12,589 25
				increase per lamp over '76	total increase over 1876.	
New York "	2,453	6 75	7 50	$0 75	$1,839 75	
Manhattan "	4,121	6 75	7 50	75	3,090 75	4,930 50
Net Decrease.....						7,658 75

In these new proposals, as in those rejected, the several gas companies bid only for such lamps as are now lighted by them respectively, neither company bidding for any lamps which were then lighted by another. The prices, however, were much more favorable than those rejected, showing a net decrease of over $7,000 from the rate paid for the corresponding months of 1876:

The following statement will show the rates bid for repairs to lamp-posts and for fitting up new lamps; the amounts being the same both in the rejected and the new proposals, to wit:

Name of Bidder.	Straightening lamp posts.	Releading columns.	Refitting columns.	Removing lamp-posts.	Resetting lamp-posts.	Fitting up new lamps.
New York Gas-light Co.....	$1 50	$1 50	$3 50	$3 50	$10 00	$10 00
Manhattan "	1 50	1 50	3 50	3 50	10 00	10 00
Metropolitan "	2 00	2 00	3 00	3 00	8 00	8 00
N. Y. Mutual "	1 50	1 50	3 50	3 50	10 00	10 00
Harlem "	3 00	3 00	4 00	4 00	10 00	10 00

Contracts have been made with the above-named companies for the 3 monts ending March 31, 1877, for lighting, repairing, etc., in accordance with the proposals above-mentioned.

The following statement will show the rate bid in the proposals for furnishing illuminating gas for lighting the public markets, buildings and offices of the city, which were received on December 20, to wit:

Name of Bidder.	Price in 1876 per 1000 feet	Price bid for 1877, per 1,000 cubic ft.	Illuminating power in candle s.
New York Gas-light Co...	$2 50	$2 40	16
Manhattan " ...	2 50	2 40	16
Metropolitan " ...	2 50	2 50	16
Harlem " ...	2 75	2 75	16
N. Y. Mutual " ...	2 50	2 50	19

The New York gas light company bid for all the public buildings situated south of Grand street. The Manhattan gas-light company for all the buildings situated between Grand and Thirty fourth street. The Metropolitan gas-light company was the only bidder for the buildings between Thirty-fourth and Seventy-ninth streets, and the Harlem company was the only bidder for the buildings north of Seventy-ninth street. The New York Mutual gas-light company bid for nearly all the buildings south of Thirty-fourth street, and entered into competition with the New York and Manhattan companies.

The prices charged to private consumers are as follows:

New York Gas-light co.....	$2 50	per 1,000 cu. ft.
Manhattan "	2 50	" "
Metropolitan "	2 75	" "
Harlem "	2 50	" "
N. Y. Mutual "	3 00	" "
Central "	3 50	" "
Suburban	2 50	" "
Municipal		

In order that the franchises and contracts of the several gas-lighs companies may be thoroughly understood, I submit herewith, and as a part of this report, copies of all franchises or grants relative to the laying of gas-mains and the manufacture and distribution of illuminating gas. These comprise the grants given to the New York, Manhattan, Metropolitan, Harlem, New York Mutual, Anthracite, City, Westchester County, and Suburban gas light companies; also the contracts with the five first and the two last-named companies, and they will be found in Exhibits "F" to "N," respectively.

The first grant or contract given in this city was to the New York Gas-light company (Exhibit "F"). This was executed on the 12th day of May, in the year 1823, and was to continue for 30 years, or until the 12th of May, 1853, and it covered all that portion of the city lying "south of a line commencing at the East River, at the foot of Grand street, and running through Grand street to Sullivan street, and through Sullivan street to Canal street, and through Canal street to the North or Hudson river." It was stipulated therein that the gas to be furnished should "be of a quality, brilliancy, or intensity equal to the gas in use for the public lamps in the city of London." The price fixed for the gas and lighting was regulated by a stipulation that the yearly expense should not exceed what would be "the expense of lighting an equal number of lamps with oil of the quality generally used for that purpose, estimating the average price of the same in the City of New York during the preceding year." This grant or contract expired by limitation of time and another contract was executed with the same company on the 10th of May, 1854, for the term of one year only. This was nearly in the same word ing as the former, except that the exclusive right was omitted, and nothing was said about the quality of the gas. It was stipulated in this contract that the gas company should be paid at the rate of $15.47·2 per annum for each and every lamp lighted by them, and the lamps were to be kept burning on an average of 2,300 hours in each year. This was on the old system of omitting to light the lamps on moonlight nights. There was a further provision, however, that if the number of hours during which the public lamps were to be kept burning should exceed the number of hours mentioned in the agreement, then, in that case,

the company should be entitled to claim and receive compensation equivalent to a pro-rata increase for the additional number of hours. By resolution of the Common Council, adopted in December, 1853, and approved by the Mayor on January 3, 1854 (seven days prior to the signing of the contract), the then commissioner of streets and lamps was directed to cause the lamps to be "lighted from dark until daylight every night throughout the year." By this resolution the number of hours were increased 3,833½ hours thereby increasing the cost of lighting each lamp to $25.78·2 per annum, and the company continued to charge this price until October 31, 1864.

The second grant given by the Common Council was to the Manhattan gas-light company, and was dated the 8th of May, 1833. This grant gave to the said company the right to lay mains "in any and all the streets, avenues, and public places of the city lying north of a line commencing at the East river, at the foot of Grand street, and running through Grand street to Sullivan street, and through Sullivan street to Canal street, and through Canal street to the North or Hudson River, and south of the line of Sixth st.," and was to continue for 20 years, or until the 12th of May, 1853. This grant contained about the same provisions and conditions as were found in the grant to the New York gas-light company, except that the price for lighting the lamps was fixed at $15 per annum for each lamp. Under this agreement the company continued to light the lamps until May, 1848. In the year 1847 resolutions were adopted from time to time by the Common Council directing lamps to be erected and lighted on various streets or parts of streets north of Sixth street; but inasmuch as the gas company could only be required to erect and light lamps south of Sixth street, the streets and residences north of that line could not be provided with gas-light. In consequence of this inability of having the new streets properly lighted, the following preambles and resolution were introduced in the Board of Aldermen on June 21, 1847, viz.:

"Whereas, The rapid growth of the upper wards of this city calls for an extension of the lamp district in the same;

"And whereas, True economy demands that permanent arrangements be made for the lighting of the city with gas, as recommended by his Honor the Mayor, in his message; therefore

"Resolved, That a special committee be appointed to confer with the President and Directors of the Manhattan gas company in relation to this important subject, and to ascertain and report to the Common Council at what rate the said company will furnish gas and fixtures, upon a contract for a term of years, and to report their own views and conclusions in the premises."

The committee asked for in said resolution was appointed, and the result of their conference was the adoption of a resolution that the then existing contract be canceled, and a new one entered into for the term of 20 years from the date thereof, and that the northerly limits of the district should be extended to both sides of 42d street from the North to the East river. The company was to receive $5 for fitting up each lamp-post and $15 for lighting each lamp 2,300 hours per annum, with a provision for a pro rata increase in case the number of hours should at any time exceed the said average number.

In accordance with the above action the original contract was canceled and a new one entered into (Exhibit "G"), to continue for 20 years from the 5th of May, 1848. It will be seen that the price fixed was the same as in the preceding contract, but that the district was enlarged and the term extended 15 years, or until the 5th of May, 1868. By the resolution of the Common Council, before referred to, the number of hours were increased to 3,833½ hours, thereby increasing the cost of lighting each lamp to $25 per annum. In 1851, and the following years, as the streets north of Forty-second street were opened and built upon, resolutions were from time to time adopted by the Common Council, directing the Manhattan gas company to lay mains and fit up and light lamps in streets as far north as Seventy-ninth street, and in compliance with these directions the company had mains in most of the principal avenues and streets including Seventy-ninth street. Under the contract the above-mentioned company continued to light the lamps until January 10, 1865.

On December 30, 1864, the following preambles and resolutions were adopted by the Common Council and approved by the Mayor on the same day, to wit:

"Whereas, Certain contracts exist between the Corporation of the City of New York with the Manhattan, Metropolitan, and Harlem gas companies, for the supplying of gas in lighting different districts of said city; and

"Whereas, It has become expedient to terminate the same; now be it

"Resolved, That the said companies shall have the right to terminate their respective contracts with the Corporation upon giving written notice to the street commissioner of their desire so to terminate said contracts, and the same shall cease, determine, and be absolutely at an end, ten days after the receipt of said written notice from either of said companies by the street commissioner; and be it further

"Resolved, That upon the termination of said contract in the manner aforesaid, the said street commissioner shall, pursuant to law, proceed to make a contract or contracts with the aforesaid companies, for the supplying and lighting of the various districts of the city with gas, and fitting up the lamps therein, for the period of one year from the 14th of January, 1865."

Adopted by the Board of Aldermen, Dec. 29, 1864.

Adopted by the Board of Councilmen, December 30, 1864.

Approved by the Mayor, December 30, 1864.

D. T. Valentine,
Clerk of the Common Council.

The Manufacture of Coal Illuminating Gas.

By Alfred P. Trautwein, M. E.
A Graduating Thesis at the Stevens Institute of Technology, Hoboken, N. J.

[Concluded from page 148.]

The aim of every manager is constantly directed towards a reduction in the percentage of unaccounted-for gas; to quite an appreciable extent, however, this loss is merely apparent, being due to a shrinkage in volume upon variations in temperature. As to the means of detecting leakage proper, it is a common practice to examine the entire system of street mains, once or oftener every year, by simply applying a match at or near each joint: a flash, of course, indicates the presence of a leak which must be made good by recaulking the joint; in some cases the mains are tested from time to time in sections, thus readily locating any suspected serious leak; this course, however, not only involves a great deal of trouble, but is generally impracticable; finally, it is advisable to institute a system of periodical inspection of the consumers' meters, since it has been shown that quite a percentage of the losses in question may be traced to errors in the registration of the gas.

All these precautionary measures, however, are almost entirely useless if due regard is not had to the pressure in the mains, which, it is hardly necessary to say, should always be adjusted to the lowest possible minimum compatible with the requirements of the supply. There are instances, on the other hand, in which it is impossible to fully comply with this principle, because of peculiarities in the topographical character of the town; taking, for example, a case in which the difference between the extreme levels is quite great, we readily observe that when the day pressure is adjusted at the works so as to meet the demands of the lower districts, the pressure in the high level mains will probably be much more than is required, there being a difference of about one-tenth inch of water for every ten feet in elevation. In such instances—and they are numerous—the manager has but one remedy at his disposal, viz.:—the use of

district governors

which are distributed throughout the town, in those districts having a serious rise in level. The object of the district governor is of a nature somewhat different from that for which the station governor is provided. The duty of the latter, as we have seen, consists in the maintenance of a constant outlet under a varying inlet pressure; the governor now under consideration, on the other hand, is provided for the purpose of maintaining uniformly throughout its district an appropriate day-pressure, which is increased automatically, and in a manner determined entirely by the changes in pressure at the governor of the works. Under these conditions not only is the supply of gas effected in a most efficient manner, but the pressure and consequently the leakage are reduced to the lowest possible figures.

The district governor is used to a much greater extent abroad than it is in this country, and the whole subject has received much more attention in Great Britain than with us. The district governors of Brothers, Peebles and others are exceedingly ingenious, and it has been stated that they are remarkably efficient. The governors just referred to belong to the class of wet governors; Cathels', on the other hand, is a dry district governor, and it deserves more than a mere passing notice because of its extreme simplicity and efficiency. Being a dry governor, the valve which regulates the release of the gas is operated by means of a flexible diaphragm; the peculiarity of this governor, however, consists in the fact that it is the reverse, in every respect and both in construction and in action, of the ordinary station governor: the valve works in the outlet instead of the inlet pipe o the governor; the valve in this case has the same form, but is inverted in order that, when raised by the action of the diaphragm, it will open instead of close the orifice; the diaphragm, finally, is acted upon by the inlet instead of the outlet pressure, this, of course, being demanded by principles which are common to all district governors.

In all instances where it is desired to effect a gas supply at a great elevation, the district governor, as previously stated, should constitute a most essential part of the distributory plant; in our particular case, on the other hand, the difference between the extreme levels is evidently not sufficiently great to demand the observance of this precaution. The distribution indeed, will be effected quite satisfactorily by dividing the city into two districts, one comprising that portion above, and the other, that below the general level of the works, each district, as already suggested, having its holder and its most appropriate pressure.

It is also proposed to subdivide each district in such a manner, that, in the event of an extensive conflagration, the threatened portion may be isolated—a measure which at times will certainly afford considerable relief; for this reason a very extensive system of fire districts was put into practice in Boston, Mass., several years ago.

services, consumers' meters, etc.

The service-pipes are generally of wrought iron, although lead pipe has been used in some instances. The wrought iron pipe is naturally very liable to corrosion, more or less rapid depending upon the nature of the soil; for this reason it is necessary to coat them thoroughly with tar or with red or white lead, all of which are regarded as equally efficient preservatives against rust; service pipes, when prepared in this manner, have been in use for years under the most unfavorable conditions, but without undergoing any serious deterioration; in at least one instance, finally, galvanized iron services have been said to give entire satisfaction.

Consumers' meters are of two kinds, viz., the wet and the dry meter, and their respective advantages and merits have been a subject of much discussion among gas managers. The advocates of the wet meter claim that it is simpler in principle and construction than its rival and that, if the proper precautions

re observed in maintaining the water at a constant level and the meter itself in a normal position, it is much more accurate than the dry meter, which is said to be subject to serious error from the fact that its moving parts are so numerous, and, therefore, liable to become deranged. The opponents of the wet meter, however, argue that since the water level continually changes by evaporation, condensation, etc., it cannot be as accurate as is claimed; that it requires constant attention for this reason as well as to prevent it from freezing during winter, and this, indeed, is the most formidable objection that can be urged against its use, particularly in this and the more northern climates. The dry meter, on the other hand, requires little or no attention; its life, however, is determined largely by the amount of impurity in the gas, the sulphur and ammonia compounds having a highly injurious influence upon the diaphragm, valves, and other fine mechanism which this meter involves.

The meters should be subjected to an occasional inspection, and should be carefully proved, not merely for the purpose of anticipating any complaints on the part of the consumer, but because such a course cannot but prove of material benefit to the company itself. Indeed, it may be stated as a general rule that the meter is more liable to register against the company than in its favor; the reason for this is very evident since a leak in any part of the instrument permits a certain percentage of the gas to pass without being registered. Among the irregularities which are thus liable to occur we will simply mention the following as the more frequent sources of trouble; the leather of the diaphragm, however carefully prepared, becomes hard and brittle in the course of time and is then very apt to become cracked; the liability to corrosion has already been pointed out; another accident of frequent occurrence is the leaking of the slide valve, while, finally, in not few instances the meter, entirely and without any previous notice, ceases to perform its duty. A frequent source of error lies in the fact that, when not amply large, the meter is liable to be overworked, either occasionally or permanently, and therefore is unable to thoroughly accomplish its object.

The use of the consumers' or house governor, numerous forms of which exist that are both cheap and efficient, should be strongly recommended. This is particularly essential in all cases where the consumption varies not only very irregularly but also suddenly, in theatres and other large buildings for instance, and more especially where the building is situated at some elevation above the general level. The object in observing this precaution in the latter case is evident; however carefully the distribution is effected, there are circumstances over which the manager has no control, which render it quite impossible to some extent to provide a uniform, steady, and appropriate pressure at every point in the district; the duty of the consumers' governor, then, consists in preventing any excess of pressure, and its necessarily injurious consequences, viz.: excessive consumption of gas, and at the same time highly unsatisfactory combustion. When once adjusted for a given pressure and supply the governor requires no further attention, while any desired adjustment is readily made. The policy of advocating the use of such an instrument, though apparently contrary in some respects to the best interests of the company, cannot, nevertheless, fail to be advantageous in the end: such a course as well as a ready attention for the complaints and wishes of the consumer will certainly tend to promote that good feeling toward the company, which is indispensably necessary to the complete success of an undertaking of this kind.

It is to be regretted that no control can be exercised, to some extent at least, over the burners of the consumers, since many apparent causes for complaint may be traced directly and solely to the defective and almost useless burners by means of which the final, and, perhaps, the most important operation, that of combustion, is performed. Under the present circumstances, it is within the power of the gas company merely to instruct its consumers as to the most efficient burners for any given purpose, to give them such information as will ensure the most thorough utilization of the light, and, finally, to instruct them as to the construction and management of the meter, in connection with which so much misunderstanding exists as to make it a constant object of complaint; such a course has been pursued in a number of instances and, we believe, it has invariably been attended with a high degree of success.

PUBLIC LIGHTING.

Though the great bulk of the daily production of gas is consumed by the ordinary consumer, yet the item of public lighting constitutes a most important revenue to the gas-light company.

The period of lighting the public lamps is determined, in the first place, by the time of rising and setting of the sun; a general practice fixes the time of lighting the street lamps at one half an hour after sun set and of extinguishing them at one hour before sun rise. In very many cases, however, it is also made dependent upon the time of rising and setting of the moon as well as upon its various phases, the object being to limit artificial illumination as far as possible. It is needless to say that this system has variously been modified, and it differs somewhat in almost every instance; in many of our smaller towns, particularly, the public lamps are invariably extinguished at a certain hour of the night.

Public lights are not generally provided with meters, mainly because the expense involved would be too great; and the amount of gas to be credited to the street lamps is, therefore, based upon the average consumption of a number of similar burners placed under precisely the same conditions as to pressure. The manager, however, is continually at a loss to know how far his estimates are actually verified; as a general rule more gas is consumed in these lamps than is allotted them, and it is very probable that much of the leakage and loss may be traced to this source.

It being usually impracticable to use meters in connection with street lamps, the use of governors has been suggested as a preventive of these variations in the consumption, brought about by changes in pressure.

ESTIMATED ANNUAL CONSUMPTION.

The maximum consumption will very probably occur on the evening of the 24th of December, for obvious reasons; the minimum daily consumption generally occurs during the latter part of June or the beginning of July, the exact date, of course, being determined by purely local conditions, not alike in any two cases. The minimum consumption is generally from 30 to 50 per cent. of the maximum.

The consumption throughout the year will vary, of course, very irregularly; among the causes which thus influence it, we may mention the frequent occurrence of days when artificial light must be resorted to earlier than usual, and at times the capacity of the works may be taxed to the utmost for several successive days; on special occasions, like illuminations, etc., the consumption may increase very largely; but these and other variations above the regular average are fully equalized by the decrease in the demand on Sundays.

For our purposes, therefore, it will suffice to assume that the consumption decreases in an arithmetical ratio during the first six months of the year, increasing, again, similarly during the remainder. The maximum daily production of gas in the projected works has already been fixed at 500,000 cubic feet, the minimum we will assume as 200,000 cubic feet or 40 per cent. of the maximum. The total annual consumption, then, is estimated at about 127,750,000 cubic feet and 10 per cent. of which would probably not be accounted for, the reasons for which have previously been given.

ESTIMATES OF COST, ETC.

For very obvious reasons we will be compelled to omit in this connection all details of the cost of construction of the works; it is estimated, however, that the gas works which has formed the basis of this paper, can be built complete as here described and can be put in regular working order for about $215,000, allowing the contractor a reasonable profit.

This estimate includes all the necessary buildings, and which will be of a plain but substantial nature; it does not include the item of the cost of the ground which the projected works would occupy, and it likewise excludes the cost of the distributory plant.

Similarily we will be compelled to omit all estimates in detail of the working expenses; it is believed, however, that they will not exceed, during the first year, the sum of $192,000. This estimate covers all expenses for material, for labor at the works, and all salaries connected with the technical management; it makes a suitable allowance for the maintenance of the works in thorough repair, as well as for depreciation in the value of the manufacturing plant by wear and tear; it includes, finally, by way of reduction, a revenue amounting to about $25,500, derived from the sale of the residual products: coke and ammoniacal liquor, there being no sale for the tar. It does not include the expenses of distribution, nor those connected with the business management, and it also excludes all such expenses like city and government taxes, and finally, does not take into consideration the interest on the capital invested.

Before concluding our remarks, it might be well to state that no claim is here made for originality in any form; the object of this paper, as stated in the outset, was merely a description and discussion of the process of manufacture of coal illuminating gas as now generally practiced, particularly in this country, and more especially in this vicinity; in considering the principles which underlie our subject, it was deemed advisable to confine ourselves solely to well and generally-accepted facts, and well-established theory; and if, in so doing, we neglected at times to name the sources whence our information was derived as well as the authorites for our statements, it was merely done with a view of avoiding a course which would frequently involve considerable inconvenience. Whenever special reference was made to the projected works, it was our constant endeavor to combine the best elements of the most recent and approved English, and, more particularly, American practice; it was deemed judicious, however, to observe, occasionally, a certain degree of conservatism—a precaution which does not require explanation.

In conclusion, the writer desires to give expression to a feeling of indebtedness toward the engineers and managers of the several gas works in this vicinity as well as elsewhere, for the readiness with which they permitted him to examine into the construction and management of their works, and for the many courtesies which were extended him. The writer desires, at the same time, to acknowledge the receipt of much valuable information from engineers and others directly or indirectly engaged in the construction and equipment of gas works.

Great Oil Explosion in Boston.—An explosion took place at the kerosene oil works of E. and F. Jenny on the evening of Jan. 25, and was heard for two miles around. The main building was completely demolished, and, with a tank containing 900 barrels of oil, was burned. The loss is from $60,000 to $70,000. One theory of the explosion is that it occurred from the ignition of naphtha gas escaping from the stills. While the fire was in progress a slight explosion occurred, which blew up some of the connecting pipes. Several people were injured. Thousands of people were drawn to the vicinity of the fire. A number were on the ice near Boston wharf, when it gave way, and Nellie Crowley of No. 117 Essex street, and an unknown boy were drowned.—*Exchange.*

The Duty on Coal.—There is no anthracite imported. On bituminous coal the duty is 75 cents per ton, gold, on the coarse coal; and on the culm of coal 40 cents per ton, gold, since August 1st, 1872. Previous to that date it was $1.25 per ton, and 45 per cent. *ad valorem*, respectively.—*Coal Trade Journal.*

Continued from page 167.

mittee to prepare the questions, and they were printed and sent to the parties addressed, at considerable expense to the Association.

In a late issue of the AMERICAN GAS-LIGHT JOURNAL, the Editor, in connection with this subject of statistics, referred to the success which had attended the efforts of the West of Scotland Association of Gas Managers, in obtaining replies to questions submitted to their members, whereby very valuable tables have been compiled, easy of reference, and highly interesting for comparison of results; as a whole, containing in a small compass a vast amount of information, exceedingly interesting and useful to the gas engineer, the gas manager, and stockholder, and to the public generally. I recommend that a similar attempt to obtain this information so necessary and desirable be again made, and that a committee be appointed to look over the questions (copies of which are now on the secretary's table for your inspection), with a view of adopting the same in whole or in part, or of adding such other questions as may suggest themselves, as being suitable and pertinent at this time.

Capt. Dresser—If I may be pardoned for speaking on this subject at this time, allow me to say that I do not think its importance can be overestimated. Considerable time has been spent this forenoon in deciding whether you would put the word coal into one resolution. A good deal of time was devoted to that. The whole trouble, I find, is to get at facts. There is plenty of theory; every man has his theory, but the trouble is to get at facts. One of the principal objects of an association of this kind is to accumulate facts. There (pointing to Mr. Greenough's tabular statement) you have before you a statement which is of immense value to you, because the circumstances under which they have been obtained are facts; they are what has been done. That is the property of the Association. Any gentleman who wishes to take up this subject can compare results, and you have something to go by. If you can extend the system of collecting facts, you will extend the usefulness of this Association immensely. Gentlemen should not feel afraid to talk about what they are actually doing, and give such information to the Association. Don't have to guess at anything or depend on the State Inspector, but take the word from the men themselves—this is deemed to be reliable. I should hope that something might be done so that we can give and accumulate something definite upon which we can see whether we are going behind hand or going a-head.

Mr. Stedman—I would like to endorse all the remarks of Capt. Dresser. I said last evening these questions should be brought up to day. I was very glad when they were printed and sent out, some three or four years ago. I did not see anything in that list that was objectionable. They called for statistics giving the necessary information, to enable any one to figure out very closely how much gas costs in the holder; and on looking over the questions with a view of eliminating those that were objectionable, I could not discover any in the whole list of forty-five questions that would seem to be objectionable. It seems to me that we owe it to each other to give this kind of information. Occasionally I receive a circular from some company, which requires answers to questions precisely like these. I have sent out circulars myself, asking for just this kind of information that we ought to have at this meeting; for instance, the price at which the different New England companies sell gas, number of miles of mains, difference between quantity distributed and quantity paid for, cost of coal, and such other figures as would enable any company to judge whether they are selling gas at a fair price, or whether they ought to be doing better to their consumers, in view of what other companies are doing. We can get the prices of gas charged by some of the companies from the GAS-LIGHT JOURNAL. Comparatively few report that officially. Then we should know the circumstances under which those prices are based. As far as this Association is concerned, we can well afford to give this information to each other. If one man is doing better than another we would be glad to see how he does it, if he wil give us the information. Some of us are doing better than we were. I would like to hear from any gentleman who has any objections to any of these questions. If there is no oqjection I suggest that a committee be appointed to take into consideration the subject of these questions now, and have power to eliminate any questions that may seem to be objectionable, and add such questions as will be of general interest to the members of the Association.

Mr. Neal—I think that committee should not only have power to eliminate, if necessary, but also to add. I hope the committee will have full power to prepare the questions. I suppose the intention is to have them presented as soon as possible; not to wait for the next meeting. If they are reported at once the secretary will have them printed.

Mr. Harbison—How are the members expected to get the benefit of the answers to the questions. Are the questions and answers to be placed on file by the secretary, or is it expected they will be read at the annual meeting?

Mr. Stedman—The proposition is that the Board of Directors are to have the whole matter tabulated and copies circulated for the private information of the members. That information can be so guarded that it will be the property of the Association.

Mr. Neal—It was our intention before to have put the questions and answers in a tabular form, for easy reference by the members of the Association. It would not have been fair for a few to have made an exhibit of their business, while the majority failed to respond to the enquiries put to them.

At the suggestion of Mr. Cushing, it was voted that the President read from the list, referred to by the secretary, the several questions in the order in which they stand, and that members be requested to state their objections, if any, to each question, when read; and, if agreeable to the meeting, that such question should stand, that the list be adopted, otherwise, not.

The President took the questions in order, beginning with the first, "Name of Company," but after reading the sixth question, "Amount of each kind of coal used?" it was found that so much time would be occupied in the discussions which each question would probably lead to, that it would be impossible, in the limitted time at the disposal of the meeting, to go through the whole list, or even one half of the same.

It was therefore voted, that the list in the hands of the President be referred to a special committee to be appointed by the chair, with instruction to examine it carefully, and to make such alterations in the same as they should consider proper, and to report the revised list to the Board of Directors.

Voted: That a suitable number of copies of said list, if approved by the directors, be printed under the direction of the secretary, and that one or more copies be mailed by him to each member of the Association.

Mr, Gerould—The committee appointed to name the time and place of holding the next semi-annual meeting, have unanimously decided to recommend that said meeting be held on Wednesday, the 15th day of August next, at the Rockingham House, Portsmouth, N. H., at 12 o'clock noon.

Voted: That the report of the committee be received, and their recommendation adopted.

Voted: That Messrs. Neal, Gerould, and Rollins be a committee to make all necessary arrangements for the meeting.

Mr. Lamson—Several gentlemen visited the works of the Boston Gas-Light Company during the recess to day, and witnessed the tests of the several burners exhibited by me this forenoon. The first test was made with the London Sugg burner. It consumed 4 92-190 feet of gas per hour: gave a candle power of 18¼. The second test made with burner F, consuming five feet of gas per hour, gave a candle power of 19·25. The test that was made with the burner of which I spoke so highly, the "Alexander" burner, consumed 4·44 feet per hour, and gave a candle power of 23.67.

Mr. Cabot—I have been thinking of the vote passed during the forenoon session, with regard to the prize for the best essay, and I am not clear whether the word coal was used in connection with the word gas. If it was, then I have some doubt in my mind whether a paper on gas made from coal in connection with oil, naphtha, or any other material, would come under the provisions or the requirements of the vote.

A long discussion then followed, when it was voted that the vote above referred to, be reconsidered.

Voted: That the vote relating to the offer of a prize for the best essay on "any subject connected with the manufacture of illuminating gas" be amended, by inserting after the words "illuminating gas," the words, "of which coal gas shall be the larger or principal ingredient."

Voted: That the secretary be directed to send to every member of the Association a copy of the vote just amended.

Col. Armington—If there is no further business to come before the meeting, I have an important vote to propose to you. I think that, not only the members of the Association, but all the gas engineers throughout the country, are deeply interested in the proceedings and discussions of our meetings, and therefore would be pleased to find in the paper so well conducted by our friend, the editor, whom we are always glad to meet on these occasions, an official report of the same. I therefore offer the following:

Voted: That the AMERICAN GAS-LIGHT JOURNAL be hereby constituted the official organ of the New England Association of Gas Engineers.

Adopted unanimously.

Mr. Neal—I think that we did not suitably recognize the valuable services of our late president, Mr Cabot, when he retired from the chair he had so well filled for the past two years. It was with regret that we heard from his lips that he must decline a re-election; although we much regretted his decision we were obliged to accede to his wishes and allow him to retire to the ranks. He entered upon its duties with extreme reluctence, and with the intention, I understand, of remaining in office but one year. But at the last annual meeting, much against his personal wishes we put him again into the chair. I move that the sincere thanks of the members of the Association be tendered to our late President, George D. Cabot, Esq., for the able and acceptable manner in which he has discharged the duties of presiding officer of this Association. The motion was carried unanimously.

The President—Mr. Cabot, you will please accept the thanks of the members of this Association, for the able and acceptable manner in which you have discharged the duties of the office from which you this day retire, much to our regret. We hope and trust that you may long be spared to meet with us in our annual and semi-annual gatherings.

Mr. Cabot—I must ask my friend Mr. Dwight to respond for me, to your kind words. All I can say is, I thank you.

Mr. Dwight—I do not like to refuse my friend, Mr. Cabot, anything. All I can say is this, that I sincerely join in what had been said and done in regard to Mr. Cabot. I think we have been fortunate in the selection of our presiding officers. Mr. Greenough took the office conferred upon him at the time of the organization of the Association, and when, after a service of four years, he declined the position again offered him, it seemed to me that we could hardly get along without him as our president. You tried hard to induce me to accept the position, but, I must confess, I had not the courage to take it, so I declined positively. When Mr. Cabot was nominated I had great fears that he would be inclined to follow my example. I rejoiced when he accepted, and since then we have often met together, and our meetings, under his direction, have been very pleasant. I look forward to these gatherings with delight, and I consider it a white spot in the year, when we come together to interchange our thoughts and feelings, and try to help each other in the duties which lie before us. A

gas man has many things to contend with; he meets with fault-finding and trouble in all directions, and it is a relief to him to leave bis business and come here to be greeted by his friends, who sympathise with him and manifest a kind fellow-feeling for one another. I assure you, gentlemen, that I value the advantages of this Association very highly. I was deeply interested, and took an active part in its organization. I am now working with it and for it, as hard as ever. In regard to the details of the workings of our several companies, I think we are too chary in telling each other what we know. I do hope that our list of questions will be such that no member will be able to find any reasonable excuse for not answering them all.

With regard to my friend, Mr. Cabot, I think him one of the best men in the country, and as he has called upon me to speak for him, I will now say that he is a glorious fellow.

Mr. Neal—Another "glorious fellow" belonging to this Association, is the gentleman who has just spoken. I have known him intimately for many years, and I respect and esteem him very highly.

Mr. Cabot—While the Association was listening to my friend, Mr. Dwight, it occurred to me that he did not exactly express my feelings. I supposed he was going to rise and thank the gentlemen for their kind wishes in my behalf. In regard to the position which I have held for the past two years by your courtesy, I do not wish you to suppose that I am going away without signifying my appreciation of the kind sentiments you have expressed. I do thank you sincerely for them.

Mr. Harbison introduced the subject of the expediency and propriety of the employees of gas companies who are required to visit the houses, stores, etc., of consumers of gas, wearing suitable badges or uniforms, to distinguish them from "tramps" and others, who visit such places for evil purposes. He suggested that it might be well to consider the subject with a view of adopting a badge, which would be recognized by the officers of the different gas companies, as well as by the consumers of each company.

Mr. Gerould—I think most companies have already adopted a badge.

The President—The Providence Gas Company have adopted a badge, and in fact everything else that is necessary to prevent their consumers from being imposed upon by "tramps" or others. All their employees who are authorised to visit houses, or any premises, are provided with a very handsome badge, to be worn on the lappel of the coat. Each man is also provided with a lithographed certificate of his appointment, which bears the signature of the treasurer of the company. In addition to the silver badge and certificate, when the inspectors are on the special work of taking the meters, they wear a hat badge with the name of the company in plain gilt letters. My employees wear a nice silver badge on the lappel of their coat. I think it is the bounden duty of all gas companies at the present day is to distinguish their employees by a badge or otherwise, that they may be known by whoever they are seen.

The Secretary—I have no further business to bring before the meeting. Before we adjourn, I wish to say, that we are all pleased to have with us our friend Mr. Nettleton, the secretary of the American Gas-Light Association, who has the interest of the gas fraternity at heart. I think before we close our proceedings, the members present will be pleased to hear from him.

The President—If there is no further business to come before the meeting, we shall be pleased to listen to some remarks trom Mr. Nettleton.

Mr. Nettleton—Mr. President and Gentlemen: When I received the invitation from your secretary to attend this meeting, I responded to him that I could receive no invitation to attend the meeting of any body of men that I knew in this country, in which I would take so much pleasure, as to attend this meeting of the New Englaud Association of Gas Engineers. After the kind word of the secretary in mentioning my name as having the interest of the gas fraternity at heart, I may say truly I desire to render such aid as I can to advance the best interests of the gas fraternity.

In some conversation I had with the secretary this afternoon, he suggested that perhaps I had some statistics on oil, or the production of petroleum, which the members of the Association would be glad to know; but there has been so much said about petroleum here, to-day, that I have some doubt whether you care to hear anything more. I have statistics running back some years. In the first place, as to the production. The average production per well, per day, of the wells brought into existence in 1874, was 50 barrels per day. The average production of the wells brought into producing condition in 1875, was 25 barrels per well, per day. Then my statistics begin with each month. In the month of December, 1874, it was 8.5 per day; in January, 1875, 8.2 barrels per day. It falls down gradually through the entire year 1875, so that December, 1875, was 7.3 barrels. January, 1876, was 6.9; August, 1876, 4.99; December, 1876, was 4.3 barrels per day. The number of producing wells in January, 1875, was 3230. The number in January, 1876, was 3314. The number in December, 1876, was 6000. Don't be alarmed, gentlemen, by the increase in number of wells. Now, I will give you the daily production of all wells In January, 1875, the number of wells was 3230, producing 27489 barrels of 42 gallons each, per day. In January, 1876, the number of wells was 3314; daily production, 22975 barrels. In December, 1876, the number of wells was 6000., production, 25390 barrels. The average daily production in the wells brought into producing condition in January, 1876, was 14.5 barrels. The average daily production for December was 9 barrels. The total daily production in the wells for the month of December, 1876, was 25390 barrels. The falling off of old wells for that same month was 3155 barrels, showing that the number of new wells brought into existence does not keep up the production. The stock of oil ran down in the year 1875, from 4,552,000 barrels the first day of June, to 3,550,000 barrels the first day of January, 1876. In the yerr 1876 it ran down from 3,989,000 barrels the first day of June, to 2,551,000 the first day of January, showing that the stock decreased from June, 1875 from 4,552,000 barrels, to 2,551,000 barrels in a year and a half. The export to foreign countries for the year 1873, was 5,654,000 barrels; for the year 1874, 5,527,000 barrels; for the year 1875, 5,533,000 barrels; for the year 1876, 6,151,000 barrels: showing to my mind that the production is gradually falling off, and that the utmost effort of the last six months have only been able to keep up the production of the preceding six months. The old wells falling off each month more than sufficient to overcome all that is produced by the new wells. The report for the month of January just closed, had not reached New York yesterday morning, but I am led to think it will show a diminution, but not a large one.

These, gentlemen, I think are matters of interest to all of us, showing what the prospect in the shape of oil is likely to be for the future.

Capt. Dresser—Mr. President and Gentlemen of the Association: While I consider it an honor to be presented to you, I am happy to say that I know the most of you, by sight, at least, and it has given me the greatest pleasure to meet you again in your deliberations, and listen to the manner in which your business is transacted. Everything about the meeting has indicated that you mean business. Every time that you come together you accomplish some fixed and definite results. Of all the things you have done to-day,—if I may speak in the way of a prophet,—I believe that there is nothing that will tend more to perpetuate the usefulness of this Association, than that one thing of gathering facts. As your esteemed president stated when he first arose, this Association is to-day an established fact. We have these statements made often, with reference to new inventions, that they have passed beyond the domain of experiments, that they are no longer mere theories, but are *established* processes. Sometimes this is not proved to be the case, but, as far as this Association is concerned it is a fact; and I have the pleasure and the honor to return you my most sincere thanks that you have determined to put that fact on record, and that you have selected the journal which I represent as the means of publishing that fact. The collection of the statistics called for in the report referred to your committee, will be of great benefit to you. In conversation with some of the members of foreign associations, and in correspondence with them, I find the same difficulty attended their early efforts in getting any statements from their managers. They begun with very few questions, but they have gone steadily on, until now their returns are very full. They are now very freely given, and the operations to which they relate are as freely criticised, all in good nature, and it enables every man to see where he stands, in relation to his fellow men. Another thing you have done to day marks a bright era in the history of this Association. You have established the principle of offering prizes for meritorious papers upon the subject to which you are devoting your lives. This principle, as you all know, has been fully recognized by many other societies. By these prizes have been brought out things of great value to the fraternity at large, which never would have been brought out at all, had it not been for the spur of honorable competition. I was very much amused by Mr. Greenough's remarks with reference to his first experience in visiting the works in London, having to send a petition to the Board of Directors before he could get in. Times have advanced since then, and while science has enlightened the mind of the gas manager, it has expanded his ideas, and he stands to-day ready to receive information and to impart what he knows to any of his fellows who are engaged in legitimate efforts to advance the gas interese, even *without* consulting his directors. The formation of these societies, and the carrying out of the principles for which they are formed, is the means of disseminating information and establishing the profession upon a fair, square basis, so that any man need not be ashamed to assert his membership; and he who has been an honored member of this Association, in days to come will take pride in it. You are exerting an influence and making a record for yourselves, so that no man need be afraid to own his membership. There are new paths which may be marked out from time to time. I know it is a little delicate to touch on these things. Whether these paths are over the coal fields or not, remains to be seen. I expect for the next year, at least, we are going to stick to coal. In the words of one who had been making some trials of some new process: "It looks still as though coal is for gas." Gentlemen, I thank you for your kind courtesy and attention, and, hoping to meet you again upon many another occasion, and that we will see you all pursuing the course which you have marked out for yourselves, making those reports clear and distinct, working hard on those papers, so that the Gas-Light Journal can have, when published, some of the finest reports that have ever been produced, I wish you good evening.

Capt. Dresser having concluded, it was voted that this Association do now adjourn, to meet at the Rockingham House, Portsmouth, N. H., on Wednesday, August 15, 1877, at 12 noon.

George B. Neal, Sec.

Asphyxiated.—Dayton Gilbert, a farmer residing near Petaluma, came to this city last Thursday and took lodgings at the Atlantic Hotel. About 10 o'clock that evening he retired to bed. The next afternoon friends called to see him, and found his room-door locked. A window opening on the verandah was raised, when a volume of gas rushed out. Gilbert was found lying on the bed in an insensible condition, with one of the gas jets turned half on. Physicians were summoned, but their skill proved unavailing, and the man died about 3 o'clock yesterday afternoon without recovering his consciousness. There is no doubt but that the deceased either blew out the gas-light, or in turning off the flame left the burner open. The deceased was a native of Canada and 59 years of age.—*San Francisco Bulletin.*

THE AMERICAN GAS-LIGHT JOURNAL AND CHEMICAL REPERTORY

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Editor—G. WARREN DRESSER.

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WEDNESDAY, MAY 2, 1877.

Correspondence

[Correspondents, in all cases, should sign their communications with their names and address in full—not for publication, unless desired, but as a guarantee of good faith.—ED.

Gas Governors.

April 10, 1877.

Mr. Editor: Will you be kind enough, in your next, to settle a disputed question between myself and another superintendent, as to whether an ordinary *steam* governor is *necessary* in conjunction with the *gas* governor, to regulate speed of engine running exhauster; whether it is of any use if placed there, or whether the *gas* governor can be dispensed with if *steam* governor is used?

Yours very truly, B.

In reply to the above we would say, our correspondent has not stated his case just as we would like to have had him, nevertheless we will answer him as we understand the matter.

First—Two governors on the same steam engine would hardly produce good results, and therefore our answer to the first question would be decidedly—No.

Second—The gas governor can be dispensed with, if steam governor is used. Now, the use of any governor on a steam engine is to regulate the speed of the engine, and make it perform its work in a uniform manner. Take, for example, an engine driving a cotton mill; the speed of the looms is required to be, say 125 pics per minute. If the engine can be regulated to just this speed a large amount of good cloth can be made each day, but if the speed is a little more, then injury is done; if less, then the amount desired is not made. Now, the manufacture of illuminating gas requires the speed of the engine to be suited to the make of gas, and as this make is constantly changing from hour to hour, so the speed of the engine must be changed to meet this varying production. Now, if our correspondent has a governor attached to his exhauster engine, which requires a certain and given number of revolutions per hour, our advice to him would be to change his governor at once, and put on a good gas governor which would regulate the speed of his engine in accordance with the amount of gas he was making.

There are gas works engines in operation, where the speed of the engine is made subordinate to other interests than the production of gas, and the compensator is depended upon when the speed is too great, to regulate the pressure; but if the speed is not great enough to keep the pressure down, then the compensator is of no avail, and the product from the coal is materially lessened, and loss occurs. When any governor is used—and no exhaustar engine should be in our opinion without one—our advice would be to procure the best gas governor, and apply it in such a manner as to produce the best results in gas making, leaving other interest subordinate to the production of gas. ED.

Retort Heats.

BOSTON, April 26, 1877.

Mr. Editor: I had the pleasure of reading in your last issue a letter from Mr. Farmer, showing a friendly interest in the figures which we have been making on retort heats. As I explained to the gentlemen who were present in Boston, it is impossible to say anything better of these experiments than that they are approximations, though their coincidence with each other shows, I think, that a tolerable degree of accuracy may be claimed for them.

I think he makes too much of the eight pounds extra weight, in the figures which he quotes. That test was taken a month later than the others, in a retort of a different shape and setting. The beds of the Boston Gas-Light Company are not, I regret to say, uniform, many of the arches being quite old, and it is possible that this retort may have received more than its share of the 2500 lbs. distributed through the bed. I have not been able to make all the experiments suggested by Mr. Farmer's letter, nor can I do so at present, but I have made several attempts to determine the heat to which the gas is subjected during the charges, two of which were made in a dull fire and two in a hotter one. The retorts were in each case charged with 200 lbs. of coal. As a standard of comparison I also submit a copy of the experiments made November 23rd and 25th, together with the quantity of gas made during each half hour, on February 16th, with similar heats.

Retort Temperatures as determined by Malcolm S. Greenough, Esq., at the Works of the Boston Gas-Light Company.

Time.	April 18. Deg.	April 20	April 20.	April 24.	Nov. 23.	Nov. 25.	Gas Made. Feb 16	Feb 16
Start.	1983	2015	2308	2115	2289	2239		
½ hour	1051	1019	1146	1211			1300	1250
1 "					1403	1400	1900	1720
1½ "	1375	1406	1567	1535			2180	2030
2 "					1660	1788	2120	2030
2½ "	1835	1857	1952	1890			2010	2020
3 "					2113	2143	1790	1700
3½ "							1210	1520
4 "	1987	2148	2052*	2275	2310	2239	740	980
			Total g	as m	ade.	.....	13250	13250

* The reason why the last temperature of the second test on April 20th was so much lower than might have been expected is, that the furnace was inadvertently clinkered just before the test was made.

It will be seen that the *total* make of gas in the two tests of February 16th was the same, being 13.250 cubic feet or 5.09 feet to the lb. The temperature of the two retorts was about the same as that given for the tests of November 25th, and both were alike, being 2235° at the start, and 2234° at the end of the charge.

Very respectfully,

MALCOLM S. GREENOUGH.

Prices of Gas Coals.

The large stock of coal inthe hands of consumers, has delayed the making of contracts later than usual, and but few sales have been made up to the present time.

The following are the present quotations for American and foreign coals; they are generally lower than for 1876, but some further reductions may take place in the caking coals, before active shipments are commenced:

Westmoreland	$5.50	$4.50) at Balt'e.
Penn	5.50	4.50)
Despard	5.35	
Marion	5.35	
Murphy Run	5.35	
Ches. & Ohhio R.R. Caking Coal	5.40	4.25 at Richmond.
Block House	4.50	1.75) Gold f. o. b.
Glace Bay	4.25	1.50) at mines.
International	4.25	1.75)
Clover Hill	4.00	
Newcastle	4.25	
Cannelton Cannel	10.00	
Peytona	10.00	

There have been some arrivals of Provincial coal, navigation from that quarter having opened earlier than usual. Under the present low premium of gold, these latter coals are likely to be used more freely than last year. We omit quotations for Waverly and Moore's Youghiogheny coals, as these companies are excluded from the New York market under the present agreement between the P. R. R. and B. & O. R. R. Some contracts for Westmoreland and Provincial coal have been made for delivery in New England, on the basis of $4.50 f. o. b. at Baltimore for the former, and $1.75 gold, f. o. b., at mines (equivalent to about $4.50 at Boston) for the latter.

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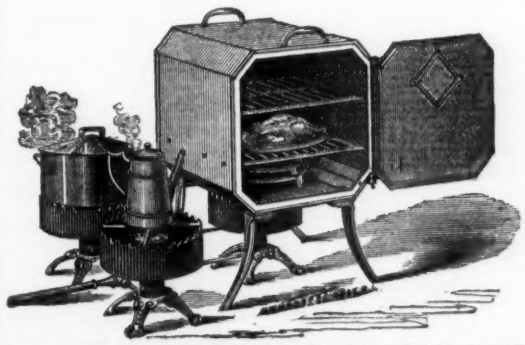

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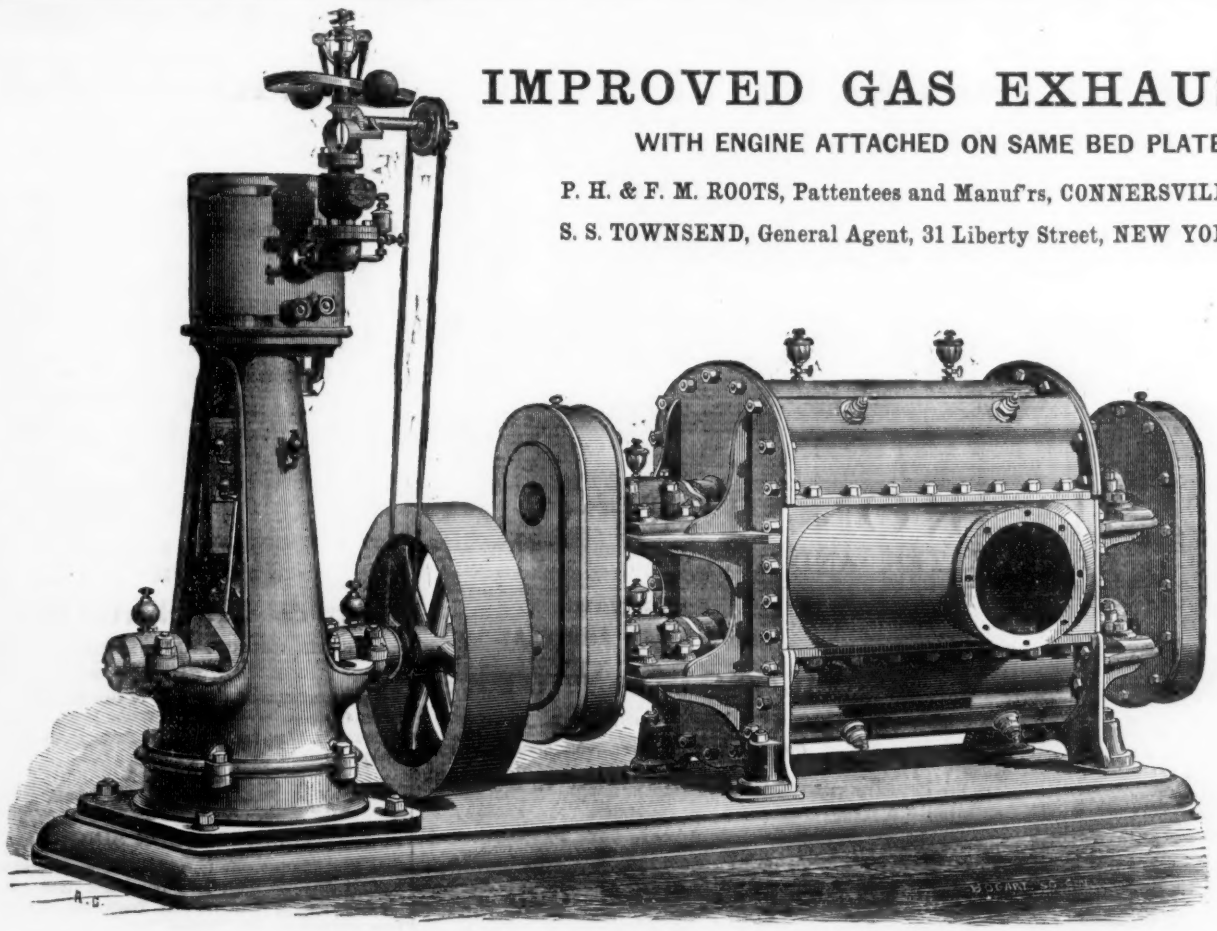

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It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York; the Brooklyn and Citizen's Gas Light Companies of Brooklyn, N. Y.; the Baltimore Gas Light Company of Baltimore, Md., and the Providence Gas Light Company, Providence, R. I.

Best dry coals shipped from Locust Point, wharves, and prompt attention given to orders for chartering of vessels.

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THE DESPARD COAL COMPANY

OFFER THEIR SUPERIOR

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To Gas Light Companies throughout the country.

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Mines in Harrison County, West Virginia.
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*** Reference to them is requested. 294-1

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FIRE BRICK & ENAMELLED CLAY

RETORT WORKS.

ADAM WEBER,

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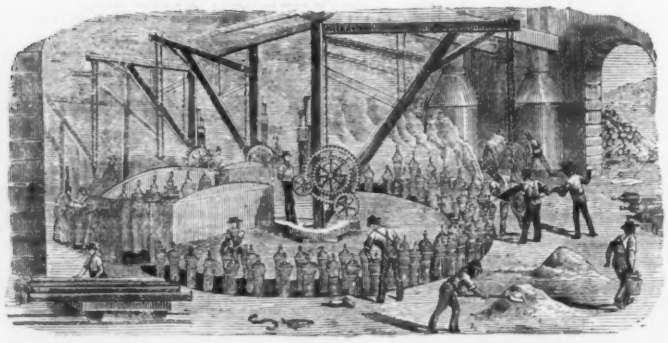

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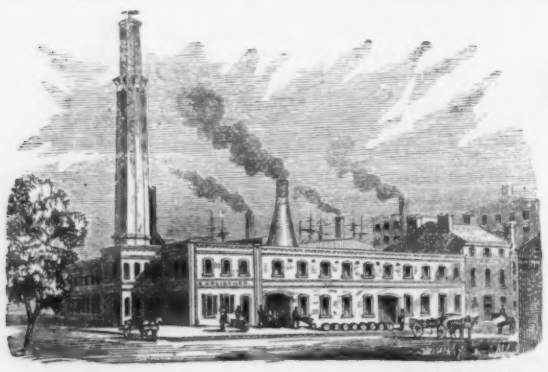

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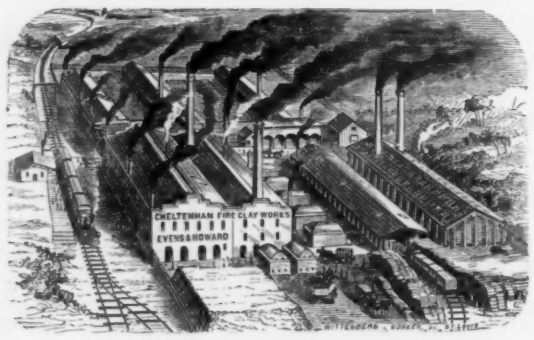

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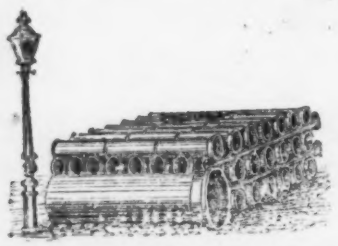

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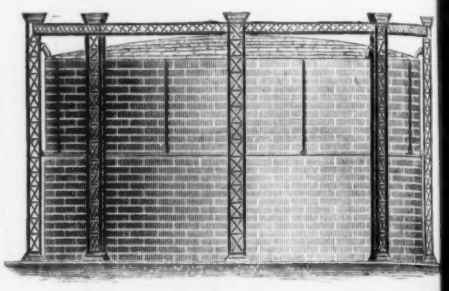

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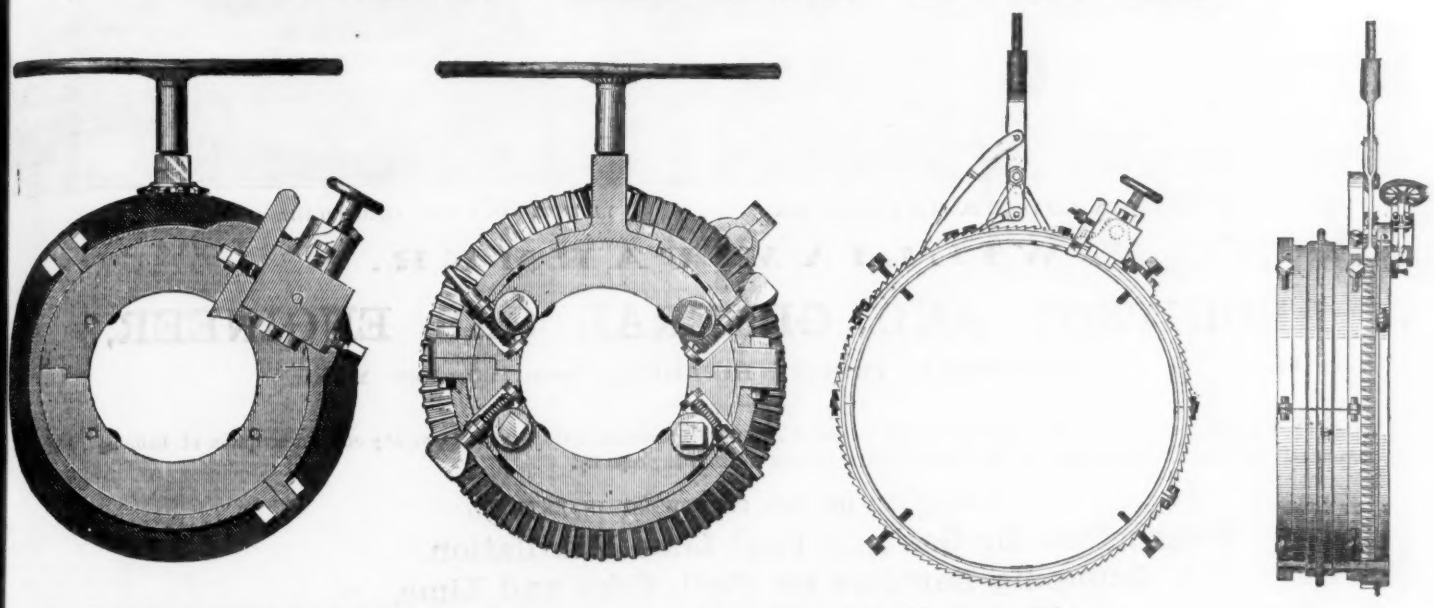

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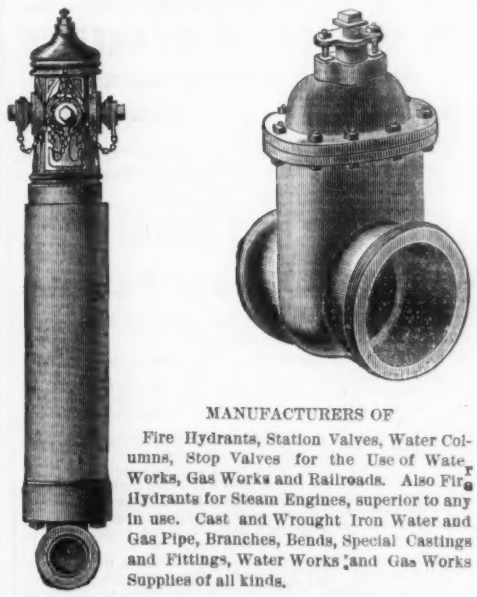

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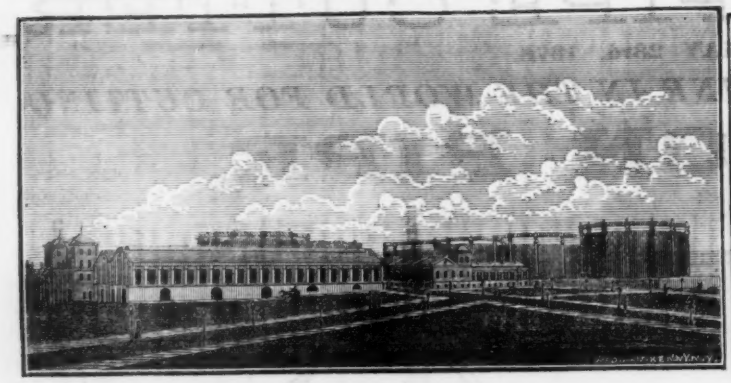

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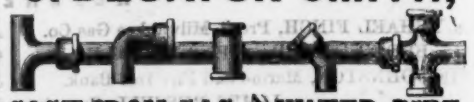

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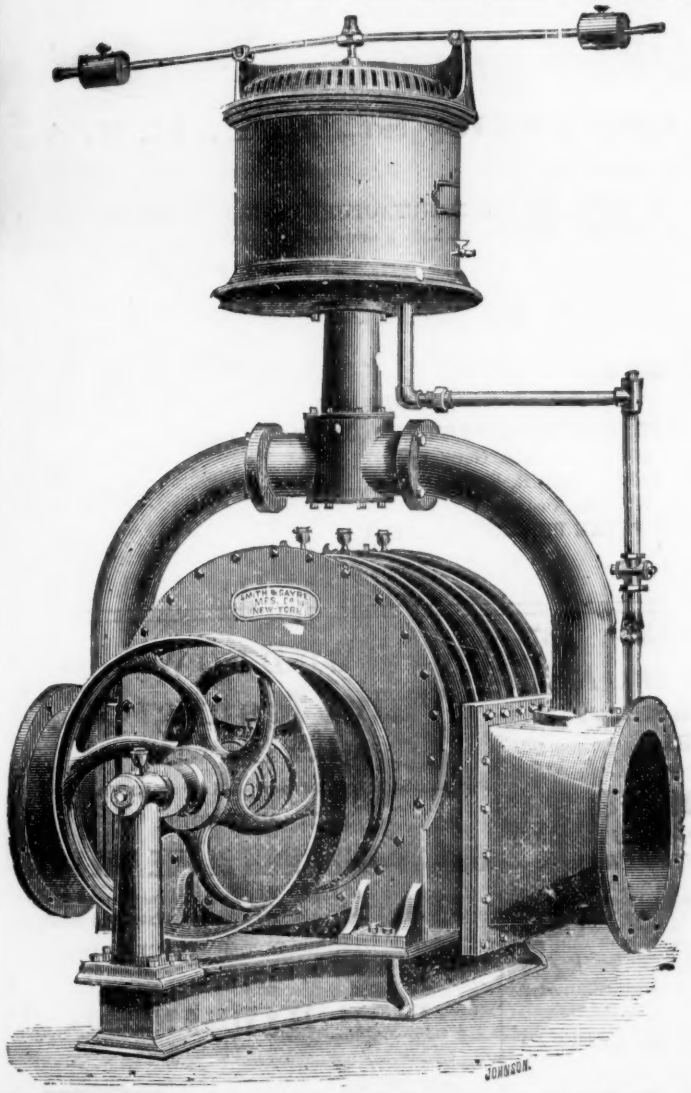

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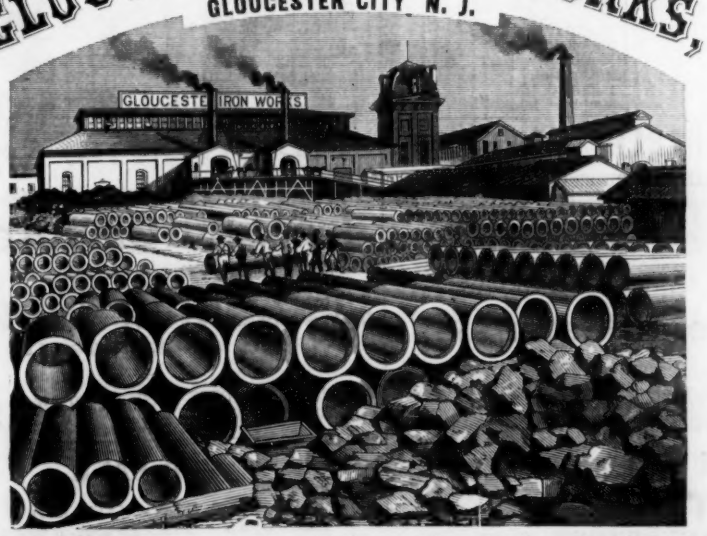

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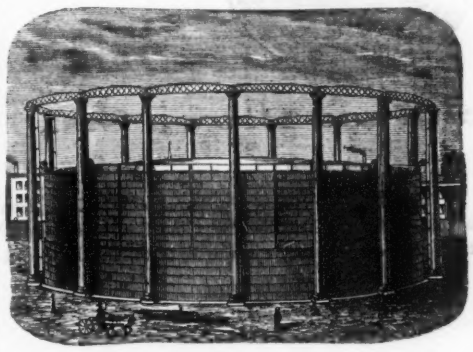

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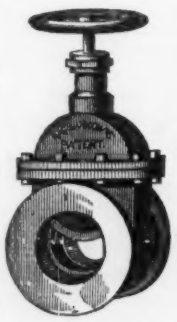

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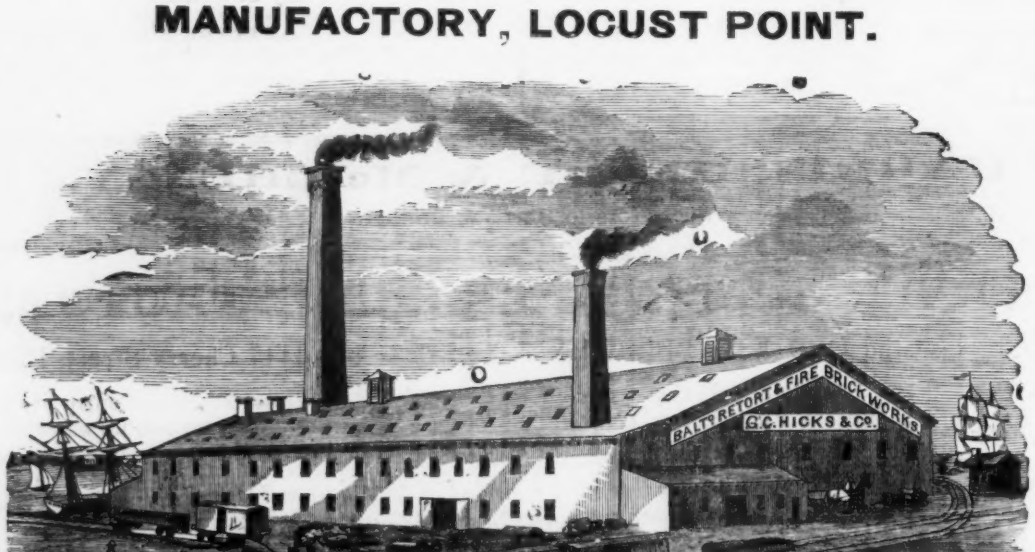

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"Yours truly, E. T. COX," *of the Centennial Jury of Awards*